Where none have gone before: Operational and Strategic Perspectives on Multi-Domain Operations in Megacities

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Proceedings of the "Multi-Domain Battle in Megacities" Conference, April 3-4, 2018, Fort Hamilton, New York

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Preface

G2, U.S. Army Training and Doctrine Command partnered with the United States Army Pacific and Australian Army to conduct a two-day "Multi-Domain Battle in Megacities" conference at Fort Hamilton, New York, April 3-4, 2018. The focus of the conference was at the operational and strategic levels across the range of military operations (e.g., combat, provision of humanitarian support, and security operations) in a megacity. Participation – both speaker and audience – included broad representation from the types of organizations that would participate in an operation employing a comprehensive approach, that is, one bringing *all* relevant partners together in the service of sought-after objectives.[1] In the case of megacities, such a partnership will generally include not only those we traditionally consider as members

[1] "Interorganizational approach" is an alternative term to "comprehensive approach," one adopted in the recently published *Joint Concept for Integrated Campaigning*. The publication identifies "interorganizational partners" as "other United States Government departments and agencies; state, territorial, local, and tribal government agencies; intergovernmental organizations; foreign security forces and government agencies; nongovernmental organizations; entities of the private sector; nontraditional security entities; and foreign populations and groups." See *Joint Concept for Integrated Campaigning*, Washington, D.C.: Joint Chiefs of Staff, March 16, 2018, 33. Unfortunately, the only place nongovernmental, inter-governmental organizations, and most others are mentioned in the document is in this definition. Much more attention and guidance regarding key relationships with other than joint, federal government, and multinational partners continues to prove elusive in both formal and informal discussions of operations and campaigns.

of a coalition – the military, other government agencies, and multinational participants – but also nongovernmental and inter-governmental organizations, representatives from industry and other commercial sectors, and formal and informal community groups.

The following pages do more than merely describe the events and resulting observations offered by speakers and audience members. They build on that foundation to consider the implications of such insights and develop recommendations of potential value. Academics, policymakers, students, doctrine writers, trainers, technologists, and first responders are among those expected to have an interest in this document.

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Executive Summary

The United States Army Training and Doctrine Command (TRADOC), United States Army Pacific (USARPAC), and Australian Army joined forces to host the initial "Multi-Domain Battle in Megacities" conference on April 3-4, 2018 in New York City. Speakers included the commanding generals of the first two organizations and Deputy Chief of the Army, Australia (later Australia's Chief of Army). Others taking the podium during the event included the Chief, New York City Fire Department (FDNY); Commissioner of the New York Police Department (NYPD); Pulitzer Prize winning author Dr. Sheri Fink, and leaders in the nongovernmental organization and medical fields.

The conference focus was on operational and strategic considerations regarding Multi-Domain Battle (MDB) undertakings in the world's largest urban areas, a focus that – as multiple speakers repeatedly emphasized – demands not only the cooperation of more-than-military organizations, but a convergence of capabilities spanning all relevant components of state and local governments and representatives from the nongovernmental, inter-governmental, and private commercial sectors in addition to both formal and informal neighborhood and community groups. Little wonder that General Stephen J. Townsend, one of the host organization leaders, specified that the too narrowly circumscribed term "Multi-Domain Battle" (MDB) would forthwith better be designated "Multi-Domain Operations" (MDO) in recognition of this expanded participation and inclusion of both operations involving combat and those otherwise.

The audience present on-site for the event was approximately half-military with a slightly lesser share representing these other sectors. The over four hundred additional individuals monitoring the gathering via live-streaming were similarly diverse as was evident in their questions provided by means of social media.

Convergence: The Multi-Domain Operations mark on the wall

MDO seeks to orchestrate the capabilities of both U.S. armed forces joint services and the above-noted other governmental, multinational, and civilian other-than-governmental organizations across five domains: land, sea, air, space, and cyber. It will do so across a continuum of challenges during the three MDO components of competition, armed conflict, and return to competition. Convergence is the objective. Succinctly, convergence is not simply each participant lending capabilities from within the bounds of its formally designated responsibilities. It is instead these organizations applying resources across those five domains and as necessary whenever appropriate, wherever appropriate, and as best capitalizes on the collective (and hopefully synergistic) effects of multiple coalition member exertions.

Speakers and audience contemplating how to achieve these desired ends were by and large men and women intimately familiar with urban security challenges and the emerging concept of MDB/MDO. Innovation was characteristic of their comments over the duration of the conference. One proposal suggested we redefine “megacities” to emphasize not only their population size (the common definition being an urban area of ten million persons or more), but also recognition of these entities’ exceptional

geographic expanses, complexity, interconnectedness, and other characteristics, to include greater than local influence.

Such innovation lay beneath virtually all discussion over the two days. The size, complexity, interconnectedness, and influence of megacities causes us to doubt the continued viability of urban operations as conducted during World War II, Korea, Vietnam, or even recent undertakings in Iraq. Much can be learned from history, but megacity considerations beyond those present during operations in lesser urban areas demand new thinking in addition to new doctrine and new approaches to training regardless of whether the tasks at hand involve combat or not.

MDO in megacities operational considerations

The essentiality of forming and exercising inter-organizational relationships was premier among the observations made by speakers both during their individual remarks and later participation on panels. NYPD Commissioner James P. O'Neill noted already-in-place relationships formed with the United States Military Academy at West Point, New York Army National Guard, and others that seek to educate participants and ensure a familiarity with capabilities such that all understand what each of the parties involved can bring to bear in times of crisis. Even when not overtly emphasized, the topic of early and consistent interaction was an underlying theme to remarks. Scott Norwood highlighted the longstanding and regularly practiced relationships USARPAC maintains throughout its Indo-Pacific area of responsibility. Dr. Sheri Fink, Captain Joel M. Montgomery, Jim Hake, and the navy's Commander Benjamin Espinosa – all with international humanitarian relief experience –described

their and other organizations' accomplishments not in individual but rather communal terms. Similar accomplishments in the future will demanded navigation between a readiness to adapt to the complex and ever-changing demands of operations in megacities and a willingness to see the need to break with the status quo and create anew. Both approaches require an understanding of in-place urban conditions such that friction between coalition outsiders and city residents is avoided to the extent possible. This requires an understanding of the megacity involved: what constitutes its current and – as applicable – pre-disaster "normal." General Townsend saw this in terms of (1) comprehending the flows and power relationships in an urban area, recognizing that the density and complexity of these phenomenon magnify the intensity of positive and negative effects, and (2) understanding how these factors combine to both complicate achieving convergence and magnifying its potential effectiveness when achieved.

Additional themes

A number of additional themes arose to complement that of partnership's importance. These included the importance of mission command, social media and other information operations, and training with partners before commitments to operations; the extraordinary demands MDO and megacities put on intelligence providers; and the necessity of understanding urban areas as systems comprised of subsystems even as they are themselves components of larger systems.

Mission command as key to megacity MDO objective accomplishment

Chief James E. Leonard described how the FDNY balances command centralization and decentralization during operations. His remarks made it clear that the mission command concept as employed by the U.S. Army is familiar to and employed by select organizations other than itself. The fundamental elements of mission command – clarity in mission and intent statements, decentralization based on trust, adapting the extent of guidance and freedom of action given a subordinate based on proven performance and a leader's familiarity with the individual, and that subordinate recognizing that the boss needs to check even the most able of more junior leaders – are integral to success both during MDO and any operation in a megacity. The convergence sought during undertakings in urban environments is impossible without those at ground level having the flexibility to adjust to circumstances. The Australian Army's Major General Rick Burr called this "combat Darwinism:" it may well be the organization best able to meet a megacity's dynamic operational demands rather than the strongest that succeeds. Training, intelligence, and other preparations cannot identify every possible contingency. What they can do, in conjunction with mission command, is groom men and women to respond effectively when conditions change and new challenges arise.

Megacities are information-rich environments.

They are also audience-dense environments. Truth is hard-pressed to compete with deliberately or inadvertently false messages, rumors, or counterproductive predispositions held by an urban population. Crowds can be formed at short notice in response to legitimate or fabricated grievances. Panic spreads far quicker when one can sense it through those in intimate proximity. These conditions offer both opportunities and risks. There are many ways of communicating with desired recipients. A coalition's deception efforts will be less questioned when passed on by family, neighbors, or other trusted agents. Alternatively, ensuring consistency of dispatches across coalition partner messages will prove challenging, and while deceiving a foe or other parties in the interest of good causes may be easier, the environment favors adversaries' efforts to persuade no less than it does one's own. The preeminence of the population to achieving operational success during some megacity contingencies suggests there will be times when information operations should take precedence over other elements of maneuver.[2]

Megacities are both systems and subsystems

The criticality of a multi-organizational approach to MDO in megacities became further evident given the character of these urban areas as systems and parts of larger systems. Urban areas are transportation, economic, social, and other hubs. Less obvious is just how interconnected the world's largest urban entities are. Social and physical infrastructure are inexorably linked such that – akin to the well-known

[2] Along these lines, one speaker suggested expanding the concept of maneuver to make it more suitable to the demands of 21st-century operations.

"butterfly effect" from complexity theory – a seemingly innocuous action affecting one part of a megacity can have dramatic impact on others within, far distant, and seemingly unconnected with the element so influenced.[3] Once again, this condition offers both opportunity and risk, the former for those better able to gage the effects of their actions. They can thereby maximize the possibility of their activities' having positive impact while avoiding others less beneficial. The risks can be daunting, however. They are in many cases unavoidable given the impossibility of accurately determining all second and higher-order effects of an individual's or coalition organization's activities on operational and strategic objectives no matter how good the analysis.

Training must take on previously short-changed challenges

This returns us to the topic of training. The complexity inherent in megacities as systems and sub-systems all but guarantees that ta leader training his subordinates for one hundred contingencies will find them confronting number 101. Those educated in the way of MDO and urban areas' challenges will be better prepared to deal with the unexpected and see commonalities with situations confronted in earlier training, readings, or other efforts to prepare. Training that emphasizes effective mission command judgment will further abet accomplishing objectives in that subordinates will be comfortable in the knowledge that exercising initiative within the bounds of mission and intent guidance is both essential and expected.

[3] The "butterfly effect" comes from the notion that "a butterfly flapping its wings today in Brazil can jiggle the atmosphere so as to cause a snowstorm in Alaska tomorrow." John L. Casti, *Complexification: Explaining a Paradoxical World Through the Science of Surprise*, NY: HarperCollins, 1994, 89.

MDO and megacities broaden the demands on intelligence

Successful exercise of initiative depends on leaders and subordinates being well informed in terms of both what to expect and how situations they face are likely to influence not only immediate outcomes but those wider in space and deeper in time. The dynamic nature of megacity environments and the desired responsiveness of MDO, however, mean that leaders and led at every level must be both consumers and producers of intelligence. An insightful observation by a single soldier on patrol can lend vital information to those at the highest decision-making levels, a situation more likely to be capitalized on if those mission and intent statements include not only immediate goals but others lending insights regarding ends more distant in time and explanations of how the now should link to the then.

Mentions of technology made their appearance during the two-day conference, but mentions were rarer than some would have expected. Important? Yes, but we are more likely to see technologies in a supporting than primary role during megacity MDO.

Recommendations

Speaker comments and pithy audience insights precipitated several recommendations as we look to the future. In keeping with the above observation that success will mandate both adaptation and invention, it is notable that what we understand by the term “coalition” merits reconsideration. MDO suggests that tomorrow’s cooperatives will consist of more than only military and other federal government entities. The resultant broadening of membership means new thinking is needed regarding how

best to capitalize on the heterogenous assets additional organizations will bring to the collective, especially when we seek the more demanding state of convergence versus the lesser of cooperation. These coalitions will tend to have finer gradations than in the past as some members will be full-on recipients of products such as intelligence while others receive greater or lesser quantities and qualities of support.

Evolutions and inventions will in turn need to be tested and practiced prior to actual commitments. Leaving these preparations to each component is a sure way to guarantee sub-optimization. Training strategies advised by likely coalition members and exercises bringing these parties together remain an outstanding need. Discussions resulting in such strategies and related exercises will in turn spur further cycles of educated evolution and invention supportive of more rapid MDO maturation and enhanced understanding of megacity opportunities and challenges.

It would seem to go without saying that such preparations need to span the entirety of possible operations…but evidence demonstrates that such faith is ill-placed. Those future coalition members will settle into comfort zones molded by past experiences. Military leaders will tend to gravitate toward the combat operations that have been the focus of their careers. Other organizations' representatives will shy away from these to ready for situations resultant of natural disasters. Amidst this less favorable observation – that few will consider readying for both these and other contingencies – is the clear opening to cover this broad spectrum during collective planning, design of live training and the models and simulations designed to support it, and other forms of preparation, thereby taking advantage of the varied experiences present in a room.

Preparations suggested by this requirement for wide-ranging, multi-player readiness inspired several additional recommendations that receive attention in the pages below. Means of ensuring consistent inter-organizational communications in line-of-sight-challenged environments are needed. This and others make it clear that fragmented approaches to achieving proficiency during megacity MDO will not meet tomorrow's needs. Discussions at higher levels see encouraging cooperation in what Multi-Domain Operations should mean across the U.S. armed forces. Efforts to prepare for urban operations lack a similar consistency of purpose both within and between services. Anointing a megacity joint proponent and the same in each service would go far toward bringing greater coherency in readying for tomorrow's MDO in megacities.

Acknowledgements

Many are those who assisted to make this conference a success. The authors sincerely thank all who served as both speakers and panel members, a group of individuals whose dedication of time could in no way be taken for granted yet who individually and collectively offered both wisdom and insight. Others assisting in too many ways to list are Captain John Amble, Fred Batchelor, Colonel Mike Indovina and those serving alongside him in the TRADOC Public Affairs Office, Colonel Pat Mahaney, Sharon McAllister, Colonel Pete Sicoli and his crew of highly capable leaders assisting in his duties as Fort Hamilton garrison commander, Paul Spinato and his superb crew of communications and information technology experts from the Army Enterprise Multimedia Center, Allison Winer, and the unsung behind-the-scenes individuals who assisted speakers in drafting and refining presentations. We would be remiss were we not to recognize the critical inputs of our audience members, both those physically present at Fort Hamilton and the many who participated from afar.

Abbreviations

Acronym	Expansion/Explanation
ADRP	Army Doctrine Reference Publication
AFMIC	Armed Forces Medical Intelligence Center
AI	artificial intelligence
ATGM	anti-tank guided missile
BA	Bachelor of Arts
BCT	brigade combat team
BUMED	United States Navy Bureau of Medicine and Surgery
CAPT	Captain (equivalent to colonel in the U.S. Army)
CDC	Centers for Disease Control
CDR	commander (U.S. Navy rank equivalent to colonel in U.S. Army)
CEO	chief executive officer
CNN	Cable News Network
CJCS	Chairman of the Joint Chiefs of Staff
CWMD	Countering Weapons of Mass Destruction
DAMO-SSF	U.S. Army HQDA G-3/5/7 Strategic Leadership Division
DOD	Department of Defense
EIS	Epidemic Intelligence Service
FDNY	Fire Department of New York City
G-2	staff intelligence section in a service command led by a general officer

GDP	gross domestic product
GEN	general
H1N1	subtype of influenza A virus
H7N9	subtype of influenza A virus
IDF	Israel Defense Forces
IGO	inter-governmental organization
ISAF	International Security Assistance Force
ISIS	Islamic State of Iraq and Syria
KS	Kansas
LANPAC	An annual conference held by U.S. Army Pacific in conjunction with the Association of the United States Army
MAJGEN	major general
MBA	Master of Business Administration
MDB	Multi-Domain Battle
MDO	Multi-Domain Operations
MERS-CoV	Middle East Respiratory Syndrome Coronavirus (the virus that causes MERS)
MS	Master of Science
MSF	*Médecins Sans Frontières*
NAMRU-6	U.S. Naval Medical Research Unit Six
NGO	nongovernmental organization
NMRCD	Naval Medical Center Research Detachment
NORAD	North American Aerospace Defense Command
NYC	New York City

NYPD	New York City Police Department
OGA	other government agencies
OPE	Operation Protective Edge
PhD	doctor of philosophy degree
REFORGER	Return of Forces to Germany
Ret	retired
SAMS	U.S. Army School of Advanced Military Studies
SARS	severe acute respiratory syndrome
SoA	Spirit of America, a nongovernmental organization
SOF	special operations forces
STE	Synthetic Training Environment
TRADOC	U.S. Army Training and Doctrine Command
USPACOM	United States Pacific Command (recently re-designated United States Indo-Pacific Command, USINDOPACOM)
USAEUR	United States Army Europe
USARPAC	U.S. Army Pacific
USMC	United States Marine Corps
USN	United States Navy
USSPACECOM	United States Space Command
XO	executive officer

1. Introduction

> Modern cities will become natural fortresses, each building a pillbox, each street a final protective line. More than ever before, gains will be measured by highly coordinated small unit actions. It is, therefore, of major importance that our army be thoroughly proficient in this type of warfare.[4]
>
> Sixth U.S. Army "Combat Notes" on the 1945 retaking of Manila

U.S. Army Training and Doctrine Command (TRADOC), in partnership with United States Army Pacific (USARPAC) and the Australian Army, conducted a "Multi-Domain Battle in Megacities" conference at Fort Hamilton, Brooklyn, New York on April 3-4, 2018. The agenda for the event appears in Appendix A.

The gathering benefited from an exceptional slate of speakers. (Biographical sketches appear in Appendix 2.):

- General (GEN) Robert B. Brown, Commanding General USARPAC
- Major General (MAJGEN) Rick Burr, Deputy Chief, Australian Army
- Commander (CDR) Benjamin Espinosa, U.S. Navy Bureau of Medicine Program Manager, Weapons of Mass Destruction Defense Operational Medicine and Capabilities Development Navy Bureau of Medicine and Surgery
- Dr. Sheri Fink, Pulitzer Prize winning author

[4] Assistant Chief of Staff, G-3, Headquarters, Sixth Army, "Combat Notes," No. 7, May 1945, 18.

- Dr. Russell W. Glenn, Director, Plans and Policy, G2, TRADOC
- Jim Hake, Chief Executive Officer (CEO), Spirt of America
- Chief James E. Leonard, Chief, New York City Fire Department (FDNY)
- CAPT Joel M. Montgomery, PhD, U.S. Centers of Disease Control, Chief; Epidemiology, Informatics, and Surveillance Lab Branch; Division of Global Health Protection
- J. Scott Norwood, USARPAC Strategic Effects Director
- James P. O'Neill, Commissioner, New York City Police Department (NYPD)
- General (GEN) Stephen J. Townsend, Commanding General TRADOC.[5]

The conference benefited from an on-site audience of 85 representatives from the military, other government departments, nongovernmental and intergovernmental organizations (NGOs and IGOs, respectively), partner nations, and commercial representatives, all with expertise in Multi-Domain Battle, urban operations, or both.[6] Those physically present were augmented by 433 individuals following the event via livestreaming, many of whom interfaced with conference attendees via Twitter.

[5] In the interest of space, speaker remarks are only occasionally footnoted below. Their comments are otherwise attributed in the main body text.

[6] The on-site audience included 37 individuals from other than military organizations (44%), the result of a deliberate effort to ensure issues received consideration by a broad spectrum of attendees representing organizations typical of those that would be part of a comprehensive approach to an operation or campaign in a megacity environment.

Within two weeks of the conference's conclusion, GEN Townsend directed that the previous moniker for the army's – and increasingly joint – concept of Multi-Domain Battle would forthwith instead be Multi-Domain Operations, a term better communicating calls for melding assets both military and otherwise during armed conflict and periods of competition not involving combat.[7]

Conference objectives specifically emphasized operational and strategic rather than tactical issues.[8] This accentuating of the upper two levels of conflict sought to orient both speakers and audience on matters too rarely given previous attention, the bulk of

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[7] As further explained in the below section "What was Multi-Domain Battle? What is Multi-Domain Operations?", while MDB inferred a need for more-than-combat capabilities, "Multi-Domain Operations" is a better moniker given the essentiality of bringing to bear more-than-military capabilities if 21st-century coalitions are to be successful.

[8] The three levels of war (or conflict) are defined in U.S. military doctrine as follows. (Page numbers are shown in parentheses.):

strategic level of warfare - The level of warfare at which a nation, often as a member of a group of nations, determines national or multinational (alliance or coalition) strategic security objectives and guidance, then develops and uses national resources to achieve those objectives. (218)

operational level of warfare - The level of warfare at which campaigns and major operations are planned, conducted, and sustained to achieve strategic objectives within theaters or other operational areas. (172)

tactical level of warfare - The level of warfare at which battles and engagements are planned and executed to achieve military objectives assigned to tactical units or task forces. (224)

Definitions are from *DOD Dictionary of Military and Associated Terms*, April 2018, http://www.jcs.mil/Doctrine/DOD-Terminology/ (accessed May 10, 2018).

funding, writing, conceptualization, and other efforts regarding urban operations having been disproportionately dedicated to tactical matters. Similarly, a second objective sought to bring attention to the essentiality of conducting Multi-Domain Operations in megacities with a coalition employing all relevant parties rather than those exclusively military while a third looked to future requirements and events capitalizing on that described in these pages. The three objectives were:

- Identify MDB operational and strategic level implications of operations in megacities.
- Identify best practices for coordination with nongovernmental and other organizations during megacity operations.
- Identify specific USARPAC, Australian Army, G2 TRADOC, New York City, interagency, and other relevant partner primary urban operations concerns and challenges in preparation for later events in this series.

What was Multi-Domain Battle? What is Multi-Domain Operations?

According to the first white paper published on Multi-Domain Battle, the concept involves a "convergence of capabilities to create windows of advantage (often temporary) across multiple domains and contested areas throughout the depth of the battlespace to seize, retain, and exploit the initiative; defeat enemies; and achieve

military objectives."[9] More concisely, MDB seeks to overcome traditional "stovepipes" so that any service or combination of services and other assets can address not only functions once viewed as (all but) exclusively the responsibility of another, but also additional tasks appropriate to the capabilities any element – military or otherwise – can bring to bear, this across the five domains of land, air, sea, space, and cyber. Articles by the previous TRADOC commanding general, General David G. Perkins, and others made it clear that the concept applied to more than battle (or combat) alone, an important delimiter as the following observation by former U.S. Pacific Command combatant commander Admiral Samuel J. Locklear makes clear:

> Between 1970 and 2014, natural disasters accounted for more than 2 million deaths in the Asia-Pacific, 57 percent of the global total…. "While you're here you may not have a conflict with another military, but you will have a natural disaster that you have to either assist in or be prepared to manage the consequences on the other side."[10]

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[9] "Multi-Domain Battle: Evolution of Combined Arms for the 21st Century 2025 2040," U.S. Army Training and Doctrine Command white paper, version 1.0, December 2017, 77.

[10] Timothy McGeehan, "A War Plan Orange For Climate Change" *Proceedings* 143 (October 2017): 48-53, https://www.usni.org/magazines/proceedings/2017-10/war-plan-orange-climate-change (accessed June 12, 2018). Also see "Overview of Natural Disasters and their Impacts in Asia and the Pacific, 1970-2014," United Nations Economic and Social Commission for Asia and the Pacific, 2015, http://www.unescap.org/sites/default/files/Technical%20paper-Overview%20of%20natural%20hazards%20and%20their%20impacts_final.pdf (accessed May 30, 2018).

In light of this need for more-than-combat capabilities, USARPAC's General Brown, many in the United States Air Force, and no few elsewhere considered "Multi-Domain Operations" the more appropriate moniker as it better represents the span of possible undertakings and missions services will have to address. The term "operations" in lieu of "battle" both communicates this broader applicability and is more in keeping with an inclusiveness encompassing other than armed forces alone. As noted above, MDO has replaced MDB as terminology.

Why megacities?

Megacities, commonly defined as those urban areas with over ten million in population, present a coalition with all the challenges inherent in cities of lesser size and other problems and opportunities in addition. Roughly a decade ago the world population passed the mark of 50% living in urban areas. Whereas there were only sixteen cities on the planet with a population of over one million in 1900, there are thirty-seven of ten times that or more in 2018.[11] Virtually any international contingency involving more than the smallest of military and greater commitments will all but inevitably require operations in built-up areas if for no other reason than sustaining resources must traverse ports and airports, most of which are in cities or towns.

[11] "Which are the largest city economies in the world and how might this change in 2025?" *PricewaterhouseCoopers UK Economic Outlook*, November 2009, 22-23, pwc.blogs.com/files/global-city-gdp-rankings-2008-2025.pdf (accessed May 9, 2018); and *Demographia World Urban* Areas, 13th edition, April 2017, 18, http://www.demographia.com/db-worldua.pdf (accessed February 9, 2018).

We need to avoid focusing too greatly on wartime contingencies to the detriment of broader readiness. As Figure 1-1 makes evident, many of the world's megacities a

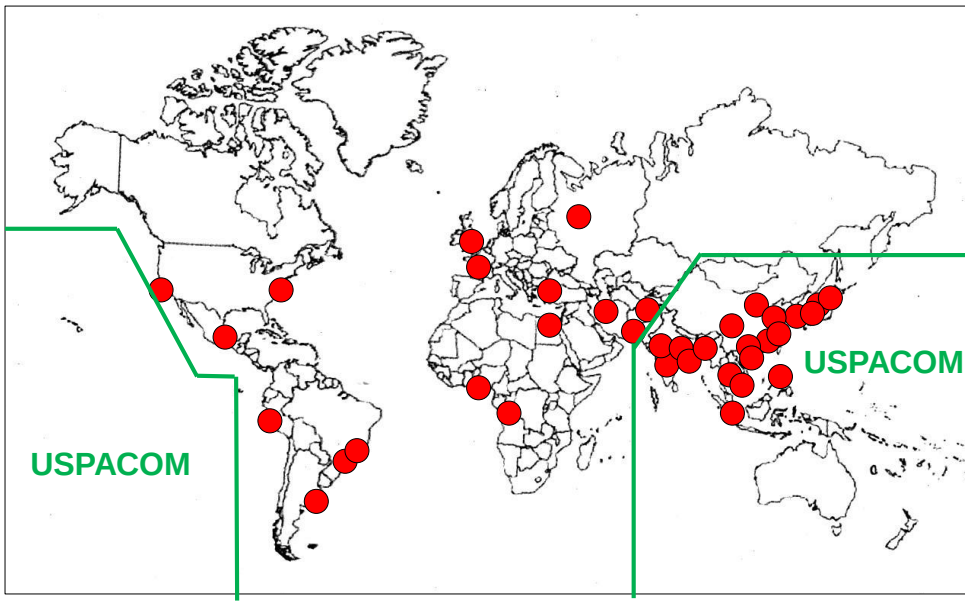

Figure 1-1: World Megacities[12]

on the "ring of fire" that traces continental coasts along the Pacific Rim. These urban areas are exposed to severe earthquakes, tsunamis, flooding, and other disasters that pose significant threats to their populations and physical infrastructure. Tokyo, the world's largest megacity, provides evidence of the potential scope of disaster that could befall these or other urban areas worldwide. Japan's capital suffered a major earthquake in 1923 that left over 140,000 dead and one million homeless. Subsequent

[12] Image from Dr. Russell W. Glenn, "Megacities: Strategic Influence and MDB Implications," presentation given at the "MDB in Megacities" conference, Fort Hamilton, NY, April 3, 2018.

disasters or brushes with catastrophe include the unfortunate trifecta of earthquake, tsunami, and failure of three of the Fukushima Daiichi nuclear power station's six reactors in 2011. In the words of Japan's prime minister at the time, the last presented a situation during which "the country came within a 'paper-thin margin' of a nuclear disaster requiring the evacuation of 50 million people."[13] The vast majority of that 50 million would have been Tokyo residents, who numbered over 37 million at the time. Some sense of the scope of that potential disaster is evident in viewing Tokyo's influence nationally, regionally, and worldwide. The megacity was home to nearly 30% of the country's population in 2016, over one in ten of its employed, had accounted for 34.7% of its gross national product the year before, and is the chosen location for over 80% of foreign companies in Japan.[14] Worldwide influence is further

[13] Japanese Prime Minister Naoto Kan as quoted in Andrew Gilligan, "Fukushima: Tokyo was on the brink of nuclear catastrophe, admits former prime minister," *The Telegraph* (March 4, 2016), https://www.telegraph.co.uk/news/worldnews/asia/japan/12184114/Fukushima-Tokyo-was-on-the-brink-of-nuclear-catastrophe-admits-former-prime-minister.html (accessed May 10, 2018).

[14] These and other statistics regarding Tokyo's status can be found in *Demographia World Urban* Areas, 13th edition, April 2017, 18, http://www.demographia.com/db-worldua.pdf (accessed February 9, 2018); David W. Smith, "Cities in Pacific Asia," in *Handbook of Urban Studies*, edited by Ronan Paddison, Thousand Oaks, CA: Sage, 2001, 433; "Top 10 Wealthiest Cities of the World by GDP," *We are top 10*, undated https://wearetop10.com/wealthiest-cities-of-the-world-by-gdp/ (accessed February 9, 2018); "Japan GDP 1960-2018," *Trading Economics*, undated, https://tradingeconomics.com/japan/gdp (accessed February 9, 2018); and Tokyo Metropolitan Government, "About Our City," http://www.metro.Tokyo.jp/English/about/appendix/appendix02.htm (accessed February 9, 2019).

obvious in Tokyo having the largest gross domestic product of any urban area in the world. Its economy is nearly on par with that of Mexico and is larger than Spain's.[15] Tokyo is what Mark Jefferson called a "primate" city: the largest city in a country, one that is also "super-eminent, and not merely in size, but in national influence."[16] No few of the world's megacities achieve this status. A small sample of those in USARPAC's area of responsibility and also not overly distant from Australia include:

- Seoul (population 24.1 million compared to Korea's second largest city of Busan at 3.2 million)
- Manila (24.2 million with Davao following at 1.6 million)
- Jakarta (second largest megacity in the world at 31.8 million, Indonesia's second most populous city being Surabaya with 1.6 million)
- Bangkok (over fourteen times the population of the next largest urban area in Thailand).[17]

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[15] "Which are the largest city economies in the world and how might this change in 2025?" *PricewaterhouseCoopers UK Economic Outlook*, November 2009, 20, pwc.blogs.com/files/global-city-gdp-rankings-2008-2025.pdf (accessed May 9, 2018).

[16] Mark Jefferson, "The Law of the Primate City," *Geographical Review* 29 (April 1939), 227.

[17] Megacity populations from *Demographia* or CIA, "East and Southeast Asia: Korea, South," in *The World Factbook*, February 8, 2018, https://www.cia.gov/library/publications/the-world-factbook/geos/ks.html (accessed February 9, 2018); CIA, "East and Southeast Asia: Philippines," in *The World Factbook*, February 6, 2018, https://www.cia.gov/library/publications/the-world-factbook/geos/rp.html (accessed February 9, 2018); CIA, "East and Southeast Asia: Indonesia," in *The World Factbook*, January 23, 2018, https://www.cia.gov/library/publications/the-world-

That Tokyo is not alone in its exposure to disaster is apparent when considering these four additional examples. Seoul is within range of North Korea's conventional indirect fire weapons. Manila has more than once suffered tropical storms' punishments, and both Jakarta and Bangkok repeatedly experience severe flooding. While the common megacity definition is such that sheer population size distinguishes megacities, not all urban areas of such magnitude possess the significance of the four above. Nor do some – several in the interior of China come to mind – have the "eminence" or "influence" (to use Mark Jefferson's terms) of less populous urban areas. Singapore is an example of the latter. With a population short of six million (including nearby built-up areas in Malaysia and Indonesia), it nonetheless has global influence given its being the world's largest ship refueling point. It is in addition a major economic power despite its geographically diminutive size. The term megacity perhaps thus merits redefinition to free it of its currently limited operational value (e.g., does a city of nine million population inherently present lesser concerns during a coalition's operation than one of ten or eleven million?). The following is proposed:

factbook/geos/id.html (accessed February 9, 2018); or CIA, "East and Southeast Asia: Thailand," in *The World Factbook*, January 25,, 2018, https://www.cia.gov/library/publications/the-world-factbook/geos/th.html (accessed February 9, 2018).

Megacity: An urban area of extraordinary population size, geographic spread, physical and social complexity, interconnectedness, and similarly exceptional characteristics, to include influence with at least national and broader regional scope.

That urban areas of such size and influence are particularly important to Australia and USARPAC is evident when one considers how many of the world's largest urban areas by population are within the latter's area of responsibility. (See Figure 1-1 again.) Further, the world's three largest national economies border the Pacific Ocean (USA, China, and Japan), megacities playing a vital role in all.

Nature of the challenge

Historical context: The battle of Manila, 1945

A bit of bad math will help give us an idea regarding the potential demands of megacity operations.[18] The 1945 battle for Manila directly involved the U.S. 1st Cavalry Division, 37th Infantry Division, 11th Airborne Division, and supporting elements of the XIV Corps. Taking into account previous battle losses and other commitments, the manpower of this total force perhaps totaled approximately two to three full-strength divisions at the time of fighting for the urban area of roughly 1.1

[18] "Bad math" in the sense that the objective is to give only a general sense of comparison rather than precise statistics.

million people covering some 14.5 square miles. Erring on the conservative side, we will say the force was the equivalent of two divisions.[19]

A quick look at estimated populations and expanse of the world's megacities in 2018 shows that their average population is just under 17.1 million living and working in 1081 square miles. Understanding that there are differences in combat power between a World War II U.S. division and those today and that other significant differences exist, it is nonetheless informative to consider what a combat operation in a 2018 "average" megacity would therefore demand. Multiplying our two division-equivalents from 1945 by 17.1million/1.1million = 15.5 we find a coalition would need (15.5)(2) = 31 divisions to accomplish its ends in our exemplar megacity. The U.S. has seventeen at the time of writing. Dividing the geographic size of our 2018 megacity by 1945 Manila's ups the requirement to (74.6 square miles)(2) = 152 divisions (rounding down).[20]

Crude estimates? Yes, but revealing nevertheless. The challenge increases further when one considers the constraints U.S. and partner forces put on themselves when large numbers of civilians are present during combat. General MacArthur's headquarters and that of Sixth Army initially severely restricted use of artillery in Manila. The constraints on use of air support were tighter yet. Both, however, were

[19] "CSI Battlebook," Combat Studies Institute Battlebook no. 13-B, Fort Leavenworth, KS: Combat Studies Institute, undated, appendix 3 and III-1. It is unclear from the source whether this is the land area of the administrative Manila entity (population approximately 800,000 in 1945) or the greater Manila urban area.

[20] 1081/1.45 = 74.6 square miles average for 2018 megacities.

considerably relaxed when U.S. casualties threatened to become unbearable. It is questionable that a similar relaxation would come today barring evacuation of most civilians, a dubious option given the logistical consequences of trying to support over fifteen million displaced persons. Recent history implies that any such encouraging of noncombatants to leave a megacity would not guarantee civilian safety. Desperate or immoral foes have not hesitated to hold an urban population hostage.

The only logical conclusion from the above calculations is one students of urban warfare long ago grasped: military forces in a coalition today cannot feasibly conduct extensive combat operations throughout a megacity's entire expanse. (Fortunately, it is equally unfeasible for any foe to do so.) That does not diminish the need to ready capabilities for operating over extended periods in significant portions of the world's largest urban regions, a requirement particularly relevant for those providing humanitarian relief or disaster assistance.

Ebola in Lagos, Nigeria, 2014

Which highlights the "near-run thing" of Ebola's July 20, 2014 arrival in the continent of Africa's second most populous megacity. On that day, Liberian-American Patrick Sawyer walked off a plane in Lagos's Murtala Mohammed Airport and collapsed. Taken to a hospital, Sawyer was questioned regarding his exposure to Ebola, a major concern in the eyes not only of Nigerians but the world. Lagos is an urban area with considerable economic, social, political, and other influence nationally, one also described as "the commercial nerve centre of West Africa with two domestic airports, an international airport and two seaports which have been

adjudged to be the largest and busiest in the continent."[21] The concern was the greater as Sawyer's travel had originated in Liberia, one of the countries particularly hard-struck by the epidemic. Sawyer stated he had not had contact with any Ebola patients or medical personnel. Doctors immediately began treating him for malaria, a disease with many symptoms similar to those for Ebola. Sawyer did not respond. Despite his denials, doctors suspected Sawyer had somehow come in contact with the infectious hemorrhagic disease. He was quarantined and treatment was initiated. Despite "immense pressure" from Liberian government officials to release Sawyer, his Nigerian doctor refused, directing that for public safety he remain quarantined and a barrier be put on his door to ensure compliance. Later investigators would find that not only had Sawyer been so exposed, he had left Liberia against doctors' orders given his having been in close proximity to a relative known to have the disease.

[21] Material here draws on several resources on the Ebola outbreak in Nigeria. These include Akaninyene Otu, et al, "An account of the Ebola virus disease outbreak in Nigeria: implications and lessons learnt," *BMC Public Health* 18 (2018), https://bmcpublichealth.biomedcentral.com/track/pdf/10.1186/s12889-017-4535-x?site=bmcpublichealth.biomedcentral.com (accessed May 8, 2018) from which this quote is taken; Faisal Shuaib, "Ebola Virus Disease Outbreak – Nigeria, July –September 2014," Centers for Disease Control and Prevention *Morbidity and Mortality Weekly Report* 63 (September 30, 2014); and F.O. Fasina, "Transmission dynamics and control of Ebola virus disease outbreak in Nigeria, July to September 2014," *Eurosurveillance* (September 23, 2014), https://www.eurosurveillance.org/content/10.2807/1560-7917.ES2014.19.40.20920 (accessed May 8, 2018).

Eight individuals would die as a result of Ebola's introduction to Nigeria, Sawyer among them. That the potential for disaster went unmet despite 894 individuals being exposed or determined to have had contact with those exposed is attributable to rapid and effective responses by Lagos and broader Nigerian medical personnel (this despite the city's doctors being on strike at the time of Sawyer's collapse), rapid action by public officials, diligent identification and testing of those exposed, participation by key elements of the country's private sector, and no little luck in that the initial victim collapsed in the airport, thus helping to minimize the number coming in direct contact with him.

It is worth considering the possible alternative. U.S. military, other government, nongovernmental, and inter-governmental officials were already in West Africa at the time of Ebola's arrival in the continent's most populous country. Response effectiveness could have been considerably less had neighboring regional countries not been dealing with the epidemic for many weeks before Sawyer's collapse in Lagos airport. Hundreds or thousands more could have been exposed had Sawyer made it the few hundred meters beyond his point of collapse to a taxi. Little wonder that some feel extraordinarily fortunate such was not the case given the nightmare of the disease's spread within and beyond Lagos, a disease that killed tens of thousands in other West African nations.

What are the lessons to be learned by the world's developed nations? Pulitzer Prize winning journalist and author Dr. Sheri Fink provided some sense of how poorly prepared even an American city was to deal with disaster. She details the breakdown of law, order, and government response in New Orleans during and in the aftermath

of Hurricane Katrina in her book *Five Days at Memorial*.[22] Her remarks during this conference highlighted the difficulties of determining which victims of an urban disaster should receive priority care or other forms of disaster relief.[23] The responses are not straightforward. Existing policies too often fail to consider difficult questions much less establish guidelines. Should children receive aid prior to others older? Should medical personnel prioritize those most in need of care (often individuals most likely to die despite that care) or perform triage as do military doctors in combat? Certainly maintaining a sense of context is essential. Some having signed a "Do not resuscitate" order went to the end of the Memorial line in terms of receipt of care, this despite their being awake, alert, and not in need of extreme measures to keep them alive at the time (and thus in a condition they would not have envisioned their signature applying to).

Before casting aside New Orleans as an example with lessons only relevant to cases of particularly egregious governmental incompetence, consider a disaster response by the United States' largest urban area. When Hurricane Sandy hit the megacity of New York on October 29, 2013, it was found that plans generally failed to anticipate lengthy losses of power, water, or other necessities. The Brooklyn community of Red Hook shared a zip code with wealthier nearby neighborhoods. For seventeen days following Sandy's landfall, portions of Red Hook were without electricity, potable

[22] Sheri Fink, Five Days at Memorial: Life and Death in a Storm-Ravaged Hospital, NY: Crown, 2013.

[23] Sheri Fink, "Medical Care in Urban Disasters: From Hurricane Katrina to the 2017 Hurricane Season and Beyond," presentation given at the "MDB in Megacities" conference, Fort Hamilton, NY, April 4, 2018.

water, garbage collection, and local medical services. Their residents therefore could not cook, access clean water, or easily find either routine or emergency medical assistance, this during a period with average temperatures in the 40s.[24]

Nine percent of New York City residents had diabetes at the time; the disease was twice as prevalent among those living in Red Hook. Twenty-six percent of Red Hook citizens had similarly been diagnosed with asthma while the statistics for the zip code at large was 8% and that for New York City 5% (NYC, used in this document to represent the political entity that is New York City rather than the entirety of the megacity). Linking medical databases before disasters to form digital maps of who has what conditions and what care is needed would be a boon to responding organizations post-disaster.

[24] Michael T. Schmeltz, et al., "Lessons from Hurricane Sandy: a Community Response in Brooklyn, New York," *Journal of Urban Health Bulletin of the New York Academy of Medicine* 90, No. 5, 800 and 803.

Megacities: A comprehensive approach is the logical approach

> Military power alone is insufficient to achieve sustainable political objectives, and there are limited means to achieve integration across the instruments of national power.[25]
>
> *Joint Concepts for Integrated Campaigning*, March 2018

The importance of a comprehensive approach to operational and strategic success when operating in a megacity was evident throughout the conference as the speakers' broad spectrum of expertise made itself known. Remarks made it clear that future coalitions will have to employ all relevant assets if they are to succeed in these most challenging of environments. Conference speakers represented military, other federal government, multinational, and local authorities; nongovernmental organizations; and industry. Audience participation included inter-governmental representation. The Australian Army's Major General (MAJGEN) Rick Burr noted that operations in the world's largest urban areas have to demonstrate two essentials: restoration of normalcy and proportionality of response.[26] The former addresses the needs of

[25] *Joint Concept for Integrated Campaigning*, Washington, D.C.: Joint Chiefs of Staff, March 16, 2018, 4.

[26] Rick Burr (Major General, Australian Army), "Future War in Cities: Some Australian Thoughts," presentation given at the "MDB in Megacities" conference, Fort Hamilton, NY, April 3, 2018.

noncombatants and long-term stability. The latter helps to ensure that decisions made regarding immediate mission requirements do not overlook longer-term goals.[27]

The New York City conference covered here provided a highly appropriate focus for the first in what is expected to be a series of events considering the implications of military and broader operations in the world's most populated and influential urban areas…and the essentiality of including all relevant partners during those operations.[28]

New York was an appropriate initial event location. In addition to its worldwide influence as an economic, social, and transportation hub, it is an exemplar in terms of urban security. Its July 1, 2017 population was 8,622.698 for the political entity itself and an estimated 21,575,000 for the megacity of which it is a part. Comments by Chief James E. Leonard of the New York City Fire Department (FDNY) and New York Police Department (NYPD) Commissioner James P. O'Neill provided context in this regard. FDNY is larger than many armies around the world, consisting as it does of 17,000 fire operations, emergency services, and support personnel. (The

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[27] Author Erik A. Claessen provides another perspective regarding proportionality in his article "The Urban Individual: Unassailable Source of Power in Twenty-First Century Armed Conflicts," *Military Review* (November-December 2015): 10: "Force requirements for urban combat are proportionate to population size rather than enemy fighter strength." While one could – and should – argue that it is not a case of either/or population size or enemy strength, the observation reminds us that there will be instances during combat in urban areas during which the adversary is not the primary concern.

[28] New York City Department of City Planning, "Current Estimates of New York City's Population for July 2017," http://www1.nyc.gov/site/planning/data-maps/nyc-population/current-future-populations.page (accessed May 4, 2018); and *Demographia World Urban Areas 14th Annual Edition: 201804*, March 2018, http://www.demographia.com/db-worldua.pdf (accessed May 4, 2018).

comparison to armies is not a casual one; the creation of the fire department owes much to the U.S. Army of 1863.)[29] Commissioner O'Neill oversees 36,000 sworn officers and an additional 18,000 civilian employees. Like Tokyo, NYC's gross domestic product (GDP) exceeds that of many countries around the world, making it unsurprising that negative 9/11 attack economic consequences totaled some $95 billion for the city.[30] Those representing the city had much to provide their audience in helping listeners to understand the need for inter-organizational cooperation. That the NYPD and FDNY practice what they preach is apparent in standing partnerships with the New York Army National Guard and other organizations in addition to their having continuing relationships with numerous U.S. Army schools (to include the United States Military Academy) and other major urban areas around the world. New York – as city and megacity – stands as a model for any wanting to better understand the value of a comprehensive approach, develop doctrine or training, or otherwise prepare for megacity operations over the horizon.

Raising the bar by changing the system

General Robert Brown made it clear that such preparation is fundamental if America's armed forces are to be ready for those contingencies. Brown posited that

[29] James E. Leonard (Chief, FDNY), "Preparing for and Managing Megacity Crises (The FDNY Perspective): 9/11 and Hurricane Sandy Lessons for U.S. Military Leaders," presentation given at the "MDB in Megacities" conference, Fort Hamilton, NY, April 3, 2018.

[30]Institute for the Analysis of Global Security, "How much did the September 11 terrorist attack cost America?", undated, http://www.iags.org/costof911.html (accessed June 12, 2018).

the U.S. Army is designed to fight on open terrain. He expressed concern that the service – and by extension the country's military at large – has lost the ability to dominate across the five domains identified in Multi-Domain Operations: land, sea, air, space, and cyber.[31] His counterpart at the U.S. Army Training and Doctrine Command, General Stephen J. Townsend, reinforced both General Brown's comments and those of fellow panel members Burr, Leonard, and O'Neill, emphasizing three key aspects of megacity undertakings:

- Flow and Power. Leaders need to understand the routine rhythms of megacity life as evident in flows and influence of political interaction, security, cultural and social exchange, economics, and information.
- Intensity. Should it come to armed conflict, GEN Townsend emphasized the risks of extraordinary casualties and damage. "Urban combat," he noted, "magnifies the effects of battle." Megacity intensity similarly amplifies the importance of MDO, which lends ways to address challenges in a timely fashion, challenges that otherwise might overwhelm a coalition's capacity to quickly comprehend and respond to situations while avoiding traditional linear approaches that could make its actions "too predictable."[32]

[31] Brown, Robert B. (General, U.S. Army), "The Warfighter and Megacities: how USARPAC is Preparing for Multi-Domain Operations in Future Operational Environments," presentation given at the "MDB in Megacities" conference, Fort Hamilton, NY, April 3, 2018.

[32] Brown, Robert B. (General, U.S. Army), "The Warfighter and Megacities: how USARPAC is Preparing for Multi-Domain Operations in Future Operational Environments," presentation given at the "MDB in Megacities" conference, Fort Hamilton, NY, April 3, 2018.

- Convergence. As with flow, power, and intensity considerations – and in keeping with Chief Leonard and Commissioner O'Neill's call for orchestrating the capabilities of all relevant partners – convergence of both U.S. Army and other pertinent organizations' activities must start now. Visits to megacities in the interest of better comprehending the environment and training implications are fundamental if we are to better orchestrate activities across Multi-Domain Operations' five domains.[33]

To emphasize these points, General Townsend posited that an argument can be made for human and information domains to complement the quintet of land, sea, air, space, and cyber.

GEN Brown, recognizing the challenges and opportunities inherent in preparing for and undertaking Multi-Domain Operations in megacities, further advised that effectively achieving the convergence necessary should cause us to "raise the bar," not to merely "improve the system," but instead "change the system." He lent support to General Townsend's comments regarding the possible addition to the current doctrinal set of five domains, noting, "the human domain…is the most important of all domains."

The remainder of this proceedings is structured around six primary themes that emerged during the conference:

- The importance of mission command

[33] Townsend, Stephen J. (General, U.S. Army), "Megacity Scenarios, Foundations, and Convergence," presentation given at the "MDB in Megacities" conference, Fort Hamilton, NY, April 3, 2018.

- MDB/MDO as partnership/coalition-based during operations in megacities
- Social media, information operations, and cyber management
- Megacity and coalition systems and subsystems
- Training for megacity operations
- Intelligence considerations during MDO in megacities operations
- Technology

The document closes with recommendations for future action and concluding observations.

2. Mission Command during Multi-Domain Operations in Megacities

> The most eloquent messages are often unintended, resulting from either the actions of careless troops or the policy statements of careless politicians. Reactions to being treated harshly and disdainfully for no good reason, especially by uninvited foreign troops, were not likely to vary greatly among otherwise diverse cultures.[34]
>
> Sir Lawrence Freedman,
>
> "The Decline of the Classical Model of Military Strategy"

Mission command, the "practice of assigning a subordinate commander a mission without specifying how the mission is to be achieved," is fundamental to both urban and Multi-Domain Operations.[35] Those seventeen words at once make clear the

[34] Sir Lawrence Freedman, "The Decline of the Classical Model of Military Strategy," in *New Directions in Strategic Thinking: ANU Strategic & Defence Studies Centre's Golden Anniversary Conference Proceedings*, ed. Dr. Russell W. Glenn, Canberra, Australia: ANU Press, to be published in 2018.

[35] This definition is taken from Russell W. Glenn, "Mission Command Overview," in *Trust and Leadership: The Australian Approach to Mission Command*, ed. Russell W. Glenn, to be published by Naval Institute Press in 2019. U.S. Army doctrine employs a lengthier description: "the exercise of authority and direction by the commander using mission orders to enable disciplined initiative within the commander's intent to empower agile and adaptive leaders in the conduct of unified land operations.… [It] emphasizes centralized intent and dispersed execution." Army Doctrine Reference Publication (ADRP) 6-0, *Mission Command* (Washington, D.C.: Headquarters, Department of the

simplicity of the concept while implying a depth of responsibilities sometimes not fully grasped during application. Those responsibilities include:

- A commander clearly articulating both mission and intent for his subordinates
- That commander adapting further guidance given to individual subordinates based on (1) the subordinate's past performance, (2) evaluation of his/her expertise regarding the mission's specified and implied tasks, (3) experience in terms of the challenges at hand, and (4) the leader's familiarity with the subordinate, among other factors. Thus a long-trusted and proven subordinate familiar with a mission's implications and this senior's expectations will tend to receive less detailed guidance than one leading a unit recently attached and with whom the senior is less familiar.
- The senior checking on his subordinates to the extent necessary to ensure performance within the constraints of the mission and intent, then providing any further guidance deemed necessary without defaulting to overly detailed direction or centralized oversight.
- Subordinates also have responsibilities, responsibilities beyond merely executing the mission within the bounds of the commander's intent. Less senior leaders must keep their commander informed to the extent necessary, thereby assisting him or her to gage whether the subordinate's efforts are as

Army, May 17, 2012), 1-1. "Mission orders" are in turn defined on page Glossary-3 of the same publication as "directives that emphasize to subordinates the results to be attained, not how they are to achieve them."

needed and determine how to most effectively allocate always-limited resources.

- Further, and a point surprisingly not understood by some subordinates, their responsibilities also include understanding that their senior is in turn reneging on his responsibilities if he does not check on those in the command. Such interactions are opportunities not only for the senior to confirm his command is on track, but also for subordinates to ask for additional guidance or resources should conditions demand.

As the above makes obvious, and as pointedly emphasized by GEN Townsend, mission command is more than merely coordinating capabilities. Coordinating capabilities is what leaders employing previous doctrine considered a success when bringing additional forces into a fight. Multi-Domain Operations likewise seek a symbiosis that goes beyond mere effective timing and bringing together of effects. One of World War II General George S. Patton's most effective writings is the little-known *Musicians of Mars* in which he likens combat to an orchestra. Each instrument plays its part, the conductor bringing the pieces together to achieve music vice cacophony:

> There is still a tendency in each separate unit...to be a one-handed puncher. By that I mean the rifleman wants to shoot, the tanker to charge, the artilleryman to fire.... That is not the way to win battles. If the band played a piece first with the piccolo, then with the brass horn, then with the clarinet, and then with the trumpet, there would be a hell of a lot of noise but no music. To get harmony in music, each instrument must

> support the others. To get harmony in battle, each weapon must support the other. Team play wins. You musicians of Mars…must come into the concert at the proper place and at the proper time.[36]

But what of operations in which the conductor cannot know the notes each participant must play at a given moment, or where the players cannot see his baton? The player of one instrument might be able to better assist in creating a masterpiece than did the composer who worked with no longer valid assumptions. Conditions change quickly during combat and disasters. Jazz-like improvisation with one player complementing or even replacing another as the situation dictates could be the preferred approach. Such are ends unforeseen by Patton, inherent in Multi-Domain Operations, and unavoidable during operations in the world's largest urban environments. Only with the above-described ebb and flow when both leader and led fully understand their responsibilities within the concept of mission command do effective Multi-Domain Operations and successful megacity endeavors become possible. "Mission command," in the words of audience member Gary Phillips, "becomes the centerpiece for urban operations of any type."

The reasons are readily apparent. First, urban areas make communications difficult even in instances where there is no adversary attempting to degrade them or

[36] George S. Patton, Jr., address to the 2nd Armored Division, Fort Benning, GA, July 8, 1941 in U.S. Army Center for Lessons Learned Handbook 16-12, "Musicians of Mars II," April 2016, iii, https://usacac.army.mil/sites/default/files/publications/16-12_Musicians_of_Mars_II.pdf (accessed June 27, 2018).

devastation due to some natural disaster. The multitude of buildings, walls, noise, and other disruptors of line of sight or reception interferes with military and other systems no less than it does cellphones. Electromagnetic pulses or other deliberate degraders would thus often exacerbate rather than create challenges (though they might also introduce new ones). Seniors obviously cannot depend on consistent links to those they command. They must prepare for intermittent communications. As conference speakers made clear, leadership has to understand that systems and sub-systems will fail during urban operations. Training can only cover a limited number of contingencies and solutions. Mission command is in part designed for just such environments, but its application will be suboptimal without understanding and practicing all of its above-noted components.

Chief Leonard's remarks made it clear that the FDNY recognizes this. While the department has and routinely continues to practice centralized control when called for, it also has procedures in place to decentralize into five borough commands when necessary. Commissioner O'Neill likewise related that his personnel were prepared for a "stand alone mode" of operations, a requirement reinforced by the widespread 2003 blackout in the city. Yet New York City's fire and police departments understand that decentralization is only one aspect of effective command and control just as it is but one element of mission command. Preparation of leaders and led alike will be fundamental to future megacity contingency success.

Darwin Comes to Town author Menno Schilthuizen describes how various plants, insects, birds, and other animals have adapted to urban environments within the span of years rather than centuries or eons. For example, studies show that some urban-

resident starlings (*Sturnus vulgaris*) today have wings that are significantly shorter than was the case 120 years ago, the result of those with such features being better able to avoid both man's technologies (primarily cars) and their pets (cats).[37] Yet military forces and other coalition partners will not have the luxury of days much less years to adapt. MAJGEN Burr highlighted what he called "combat Darwinism": situations during urban operations in which it is not necessarily the strongest but rather the most adaptable that will survive. Mission command is a form of such adaptation. Like shorter wings, it provides the ability to react faster than a threat in situations where fractions of seconds might mark the difference between success and failure. That such is true at the tactical level in combat is no surprise. Less obvious: the importance of timely reaction at the operational and strategic levels where achieving objectives means looking far deeper into the future than securing a city block or ridding a megacity of an enemy. As operations in Iraq made only too clear at a national level, accomplishing a desired end state is as dependent on establishing the conditions for long-term stability and good governance as success in combat. (This is evident today when looking at the continuing effects of Baghdad's previous government-sponsored sectarianism in Iraq). Yet quickness is not always essential. While "it is easier to drop a bomb than an electron," in Burr's words, it may at times be a more deliberate approach that leads to success sooner. What expectations a population has, which groups should prove amenable to coalition messages, who the

[37] Menno Schilthuizen, *Darwin Comes to Town: How the Urban Jungle Drives Evolution*, NY: Picador, 2018, 97-99.

key subjects of social media efforts should be, and additional factors requiring other than a bomb will become evident only when coalition representatives operating cheek-to-jowl with a noncombatant population determine them, something a commander's mission and intent must make clear. The coalition successfully applying mission command will be instilled with an appreciation for "sustainable adaptability," readying its members for dealing with uncertainties rather than only specific situations. Surprise will be the norm in a megacity. The unexpected should be expected. Mission command well applied readies practitioners for dealing with both. Recent operations in sub-megacity urban environments suggest priorities will vary depending on population segment. What is necessary to obtain the support of noncombatants in one neighborhood will differ from that in another. We can depend on finding that what is considered acceptable outsider behavior by those from one community will be less so elsewhere. This is especially true in megacities where the presence of various ethnic groups is the norm. A recent estimate suggests that the number of languages spoken in New York City approaches 800 (and where but 51% of residents speak exclusively English at home).[38] General Charles Krulak (Commandant of the U.S. Marine Corps in the mid-1990s) suggested urban combat operations at the tactical level should be thought of as a "three-block war," one in

[38] Sam Roberts, "Listening to (and Saving) the World's Languages," *The New York Times* (April 29, 2010), https://www.nytimes.com/2010/04/29/nyregion/29lost.html; and Arun Venugopal and the WNYC Data News Team, "The Many Languages of New York City," WNYC (December 7, 2012), https://www.wnyc.org/story/255668-blog-census-languages-new-yorkers-speak/ (both accessed June 7, 2018).

which a unit might find itself fighting a peer competitor in one block while in two adjacent blocks the same organization could be conducting stability tasks (e.g., helping contain a riot) in one while distributing humanitarian aid in the third. The metaphor is no less applicable at the operational and strategic levels. Further, Krulak introduced the concept of the "strategic corporal," the lower-echelon leader whose decision has impact – positive or negative – on objectives at echelons many levels above his or her own. The same is particularly true in urban areas where second and higher order effects are so difficult to determine, quick to be felt, and can have repercussions nationally and beyond (a point to which we will return below in our discussion of megacities as systems and components of larger systems).

Commissioner O'Neill made the somewhat counterintuitive observation that it is simplicity rather than technological innovation that holds the greatest promise for dealing with the complexity of the world's most populous urban areas.[39] The example was his department's conduct of activities to protect NYC's population against terrorist threats in Times Square on New Year's Eve, certainly a complex problem. The NYPD commissioner's solution enabled individual units to execute their assigned tasks without distraction or over-supervision. He dealt with a potential sniper threat by massing sniper and spotter teams around the famous square and assigning each team a specific area to surveil. He mitigated chances of a vehicle-borne attack by

[39] James P. O'Neill (Commissioner, NYPD), "Preparing for and Managing Megacity Crises (The NYPD Perspective): 9/11 and Hurricane Sandy Lessons for U.S. Military Leaders," presentation given at the "MDB in Megacities" conference, Fort Hamilton, NY, April 3, 2018.

blocking the roads leading to the celebration with fire and garbage trucks. Communications tools monitored social media sites to provide a simplified and intuitive map of crime and potential emerging threats in the city. O'Neill did not burden his men and women with overly complicated technologies that distracted from core activities, nor did he ask them to execute tasks with which they were unfamiliar.[40]

Mission command: simple in concept but challenging to employ barring education of and practice by senior and subordinate alike. Commissioner O'Neill's use demonstrated its benefits can apply to civilian no less than military organizations, just as they can to comprehensive approach operations melding the two in the service of objectives. Achieving a comprehensive approach's potential will be a matter of leadership, initiative, innovation, and – not to be overlooked – bureaucratic action (the last, as Jim Hake observed, fundamental to removing barriers that can currently block needed convergence).

[40] The author thanks conference attendee Major (U.S. Army) Jesse Skates for his notes regarding Commissioner O'Neill's remarks.

3. The Comprehensive Approach and Convergence: Keys to Success during Multi-Domain Operations in Megacities

> "One of the most dangerous forms of human error is forgetting what one is trying to achieve."[41]
>
> Paul H. Nitze, U.S. Deputy Secretary of Defense,
> as quoted by MAJGEN Rick Burr, Deputy Chief, Australian Army

Multi-Domain Operations demand more than cooperation. Convergence is the standard.[42] In GEN Townsend's words, "episodic synchronization is not enough."[43]

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[41] Major General Rick Burr (Australian Army) during "MDB in Megacities" conference, Fort Hamilton, NY, April 3, 2018.

[42] Convergence in terms of Multi-Domain Operations is defined as "the integration of capabilities across domains, environments, and functions in time and physical space to achieve a purpose. Capability convergence produces physical, virtual, and/or cognitive windows of advantage that provide the freedom of maneuver required for forces to defeat adversary systems and ultimately friendly objectives. Achieving convergence requires a sophisticated understanding and mastery of the dynamic relationship between capabilities, time, spaces, and purpose." U.S. Army Training and Doctrine Command, "Multi-Domain Battle: Evolution of Combined Arms for the 21st Century 2025-2040," version 1.0, December 2017, 3.

[43] GEN Stephen Townsend (U.S. Army) during "MDB in Megacities" conference, Fort Hamilton, NY, April 3, 2018. Remark was repeated during GEN Townsend's video-teleconference keynote presentation to LANPAC 2018, Honolulu, Hawaii, May 22, 2018.

He related how during recent operations in Iraq and Syria, it could take weeks to coordinate an effort that only took a couple of days to execute:

> U.S. and coalition forces launched cyberattacks last year to help identify and destroy several command posts of Islamic State leaders, according to the former head of the task force to defeat ISIS in Iraq and Syria. "This is a vignette that actually played out during and after the battle of Mosul and after the battle of Raqqa," said Gen. Stephen Townsend…. U.S. and coalition forces were scouring the middle Euphrates River Valley, between Al Qa'im in Iraq and Raqqa in Syria, in search of command posts used by ISIS leaders…. Friendly forces had located the enemy's primary command post in the area but couldn't find the enemy's alternate sites. "We knew that the enemy had alternate command posts, but we didn't know where they were…. So rather than strike the primary command post and then have the enemy be unknown to us for a while…one of the subordinate units proposed that we use...capabilities from space and cyber to deny the enemy's primary command post, forcing him to move to and unveil his alternate command posts," he explained.
>
> The plan worked, Townsend said. When the enemy moved, "we struck the alternate command posts kinetically with lethal fires once we identified them, and we worked our way backward to the primary command post."
>
> The coordinated strikes were a clear example of multi-domain operations…. "It's a multi-domain operation; it unfolded in air, land, sea, cyberspace and space," Townsend said. But it took too long to complete -- about three weeks, he said, describing how some of the assets used required authorization from

> the national level and coalition partner nations…and "it was against an enemy that could not really contest us in any of the domains."[44]

MDO will not eliminate the need for planning, war-gaming, and rehearsing, but representatives from the five domains in a mature MDO will ideally be familiar enough with their counterparts' capabilities to dramatically reduce the time between mission receipt and successful completion. Continuous practice in orchestrating assets during the three components of MDO –competition, armed conflict, and return to competition – will be necessary if a coalition is to achieve the desired convergence. Megacity operations will demand a mutual familiarity and trust as do those in no other environment. Even short-duration undertakings of limited scope will require all-but-seamless inter-organizational operations within a military force and between the elements of that force and other governmental and extra-governmental coalition partners.[45] Achieving these ends may require casting aside longtime organizational

[44] Summary of General Stephen Townsend remarks during his video keynote presentation to LANPAC 2018, Honolulu, Hawaii, May 24, 2018, as related in Matthew Cox, "US, Coalition Forces Used Cyberattacks to Hunt Down ISIS Command Posts," *Military Times* (Mary 25, 2018), https://www.military.com/dodbuzz/2018/05/25/us-coalition-forces-used-cyberattacks-hunt-down-isis-command-posts.html (accessed June 1, 2018).

[45] "Coalition" as used here is meant to include what many would consider non-traditional members of such a cooperative effort, to encompass even organizations notorious for not wanting to associate themselves with military organizations. Those interested in further discussion in this regard are referred to Russell W. Glenn, *Band of Brothers or Dysfunctional*

fixtures such as component commanders in the interest of oversight comfortable with the simultaneous application of resources from all domains relevant to achieving objectives. Rather than organizationally-focused management, operations in megacities may instead be geographically, functionally, or population-segment based akin to current day combatant commands, e.g., one leader oversees all activities oriented toward combating a foe while others are responsible for those portions of a city not yet subjected to combat or in which providing humanitarian relief or stability is the dominant demand. That those in these management positions may not be military is evident; we remind ourselves of the savvy inherent in the city of New York's in excess of 60,000 first responders intimate with those duties entrusted to them.

Nor need coalition members be exclusively civil authorities or members of official organizations. The man (or woman) on the street and members of ad hoc community organizations will provide local insights formal authorities are unable to offer. Bringing these assets to bear will require management of expectations (to include communicating with select elements of the urban population prior to entry into the urban area when possible) and efforts to at least deny support to adversaries if not bring citizens "on side." Coalition and extended relationships will at times constitute what we might call "competitive cooperation" in which relationships at least temporarily put select differences on hold in the interest of (somewhat) shared

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Family? A Military Perspective on Coalition and Alliance Challenges During Stability Operations, Santa Monica, CA: RAND, 2011.

objectives. The case of the U.S. military cooperating with known organized crime members in control of NYC docks and ships during WWII is a historical case in point.[46]

Effective partnerships in this regard will more often than not require the outsider to adapt to the host rather than vice versa.[47] Forcing local authorities to modify standing organizational structures or otherwise alter well-established norms can introduce counterproductive and often unnecessary frictions. The FDNY, for example, conducts their operations in four phases generally unfamiliar to military planners: pre-planning, operational, recovery, and restorational. It is notable that megacity authorities are not the only ones involved during times of crisis. Chief Leonard reminded audience members that state and other officials will also be working in support of urban governments. Better to have these outsiders' hands fit the local glove than attempt to force change, particularly in times of crisis as will quite likely be the situation that precipitated an external party's arrival.

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[46] For one of several sources on this relationship, see Tom Brooks, "Naval Intelligence and the Mafia in World War II," http://ncisahistory.org/wp-content/uploads/2017/08/Naval-Intelligence-and-the-Mafia-in-World-War-II.pdf (accessed June 13, 2018).

[47] Generally, but not without exception. Corruption, organizational structures that have proven ineffective, or other conditions may dictate replacing those in place. In this regard, see Mara Karlin, "Before you help a fragile state's military, ask these uncomfortable questions," Brookings Institute blog entry, June 22, 2018, https://www.brookings.edu/blog/order-from-chaos/2018/06/22/before-you-help-a-fragile-states-military-ask-these-uncomfortable-questions/ (accessed June 27, 2018).

That the NYPD and FDNY both maintain relationships with army and other external organizations in times of routine is the result of their leaders recognizing the value of established ties when the everyday gives way to emergency. Familiarity both at the organizational and personal levels will prove essential as, in the words of one panel member, "no magic radio will enable relationships and collaboration" for which a foundation has not been previously established. Well-chosen (and well-trained) liaison officers will be key in both forming and capitalizing on these relationships. Speaker Scott Norwood reinforced that the desired effectiveness is likely to be all the better if such ties are habitual ones.[48]

Such a state of affairs will unfortunately not always be possible. Speakers Sheri Fink, Joel M. Montgomery, and Benjamin Espinosa all had experience in West Africa during the Ebola crisis of 2014-15. Quickly developing working relationships with local religious leaders, NGO and IGO representatives familiar with and trusted by the local population, other influential authorities, and understanding cultural norms were vital, particularly in instances where those norms were in opposition to behaviors vital to interdicting the spread of disease. Such connections were important in Lagos, Nigeria after Patrick Sawyer's introduction of Ebola to the city when it became critical to disabuse residents of mistaken beliefs regarding widely-held but ineffective disease prophylaxes. Likewise key to these relationships: Establishment of

[48] J. Scott Norwood, "The Future of Multi Domain Battle: Rethinking How We Think About Joint and Combined Integration," presentation given at the "MDB in Megacities" conference, Fort Hamilton, NY, April 3, 2018.

collaborative decision-making processes. Here, as more often than not elsewhere, it proved valuable not to introduce the inevitable friction resultant from an outsider's seeking to impose "better" solutions to challenges when in-place approaches are acceptable.

Melding conference discussions of mission command and convergence, Spirit of America CEO Jim Hake introduced what he called "informed decentralization" for working with civilian organizations not familiar with mission command.[49] Akin to the above observation that the knowledge – and cooperation – of local citizens and authorities is invaluable, Hake suggests forming public-private partnerships that facilitate decision-makers and those allocating resources capitalizing on information provided by individuals most familiar with the problems at hand. Facilitation by private parties can add flexibility and agility to help identify and then overcome barriers organizations inevitably face when operating in austere environments.

[49] Jim Hake (CEO, Spirit of America), "Employing a Whole of Nation Approach in MDB," presentation given at the "MDB in Megacities" conference, Fort Hamilton, NY, April 4, 2018.

4. Social Media, Information Operations, and Cyber Management during Multi-Domain Operations in Megacities

> Churchill's claim that "a lie gets halfway around the world before the truth has got its boots on" has rarely been more apt.[50]
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> "Gaza conflict: the social media front line," *The Week*

The above comment was made in reference to the 2014 Operation Protective Edge (OPE) the Israel Defense Forces conducted largely in the highly urbanized Gaza Strip. It applies no less to megacities wherein high population density combines with ubiquitous and multiple means of communication to provide fertile ground for parties wishing to introduce misinformation in the service of their ends.

Drawing further on the example of Gaza, perhaps the best-known case in this regard involved Twitter messages sent by sixteen-year old Farah Baker during OPE (who tweeted using the name Farah Gazan).[51] With a precocious sense of the dramatic (in one of her tweets she wrote, "I can't stop crying. I might die tonight."), Baker's

[50] "Gaza conflict: the social media front line," *The Week* (July 18, 2014), http://www.theweek.co.uk/middle-east/59554/gaza-conflict-the-social-media-front-line (accessed December 15, 2014).

[51] This brief description of Farah Baker's impact and resultant challenges is taken almost verbatim from Russell W. Glenn, *Short War in a Perpetual Conflict: Implications of Israel's 2014 Operation Protective Edge for the Australian Army*, Canberra, Australia: Australian Army, 2016, 78-79.

followers reportedly swelled from 800 to in excess of 200,000 over the several weeks of the operation.[52] Asked how a state information operations organization might counter such grass roots inputs, Israeli media experts agreed that it was an all but impossible task. Quoting media executive Hanani Rapoport,

> When you have a girl in Gaza reporting, you don't need CNN. You have "user generated content." [Was she operating independently?] It doesn't matter. The effect was to make public opinion and it did it…. Even if you found she was the daughter of a Hamas leader sitting in Switzerland and writing the content, it doesn't matter. The IDF [Israel Defense Forces] can state that two days later, but it's too late…. She is the underdog. That is not to say Israel should give up, and it is trying to do better [but "reporting" like Baker's is] instantaneous. It doesn't cost a penny. Eventually, if it's good, it has the same effect as being on CNN. How many people watch any of the news broadcasts anymore?[53]

Others will learn from and adapt Farah Baker's success during contingencies to come. That the pool of prospective Farahs could potentially be multiplied many times over in a megacity seems obvious (and once augmented by artificial intelligence, nearly

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[52] "Farah Baker, Palestinian teenager tweets real-time bombing in Gaza: 'I might die tonight'," *news.com.au* (July 29, 2014), http://www.news.com.au/world/farah-baker-palestinian-teenager-tweets-realtime-bombing-in-gaza-i-might-die-tonight/story-fndir2ev-1227005591182 (accessed March 31, 2018); and Lynda Franken, "The war of words during Operation Protective Edge," *Palestine Monitor*, (December 1, 2014), http://palestinemonitor.org/details.php?id=20ojhia9081y0u519ol7h (both accessed March 31, 2015).

[53] Hanani Rapoport (CEO, Jerusalem Capital Studios) interview with Dr. Russell W. Glenn, Tel Aviv, January 15, 2015.

ubiquitous). Commissioner O'Neill related the importance of controlling responses to catastrophic disasters and other situations to hopefully interdict (but at a minimum dampen) the effects of rumor and false information. Consistent presentation of facts and key information across a coalition is both important and difficult to accomplish during such periods. It requires constant coordination between parties interfacing with the media and public via the many mediums available today. Unexpected questions or events further complicate the challenge. Those dealing with the Ebola disaster in 2014 West Africa, for example, were confronted with numerous rumors, to include belief the contagion was a deliberate effort by government authorities to control population numbers. Dr. Montgomery related that the same mission required those present to effectively tamper fears raised by caregivers wearing protective clothing after it was found individuals in host nation populations believed the attire was affiliated with practice of witchcraft. Controlling rumors could have the additional benefit of reducing the numbers of "worried well" or sympathetic sufferers of illness or a chemical, biological, or radiological attack. These are individuals who take on the symptoms and believe they are suffering the consequences they see or hear of in others while actually not being ill or contaminated. Such individuals can exceed the number of "real" sufferers.

Figure 4-1: Some West Africans associated protective suits with witchcraft[54]

Social media offers opportunities in addition to challenges, of course. Opening further ways to communicate with segments of a population otherwise inaccessible, gaging popular moods and expectations, and augmenting other sources of intelligence are samples. Sheri Fink related how individuals in Houston used social media to inform officials of those in need of help, a system found by many to be more effective than dialing 911 as was formally encouraged. She also spoke of the loss of trust resultant when foreign medical personnel were given access to higher quality treatment facilities than were locals in West Africa. While unlikely to completely address this

[54] Image from Benjamin Espinosa (Commander, USN), "Operation United Assistance: The Department of Defense Response to the West African Ebola Virus Epidemic," presentation given at the "MDB in Megacities" conference, Fort Hamilton, NY, April 4, 2018.

loss, noting that international medical participation would suffer in the absence of such facilities could have a mollifying effect during similar future contingencies. Knowing an adversary also employs social media – e.g., using crowd sourcing to track events and plan – means various platforms might present a friendly force operating in a megacity with deception opportunities (or open avenues for it to be deceived in turn). General Brown cited an example of successful urban deception in Mosul. Hundreds of false polling sites for a national election were leaked to a government official known to be working with Al Qaeda, an action combined with others to reduce the number of successful attacks against voters. General Townsend, in turn, recalled how monitoring of ISIS and other social media platforms provided a more accurate trace of front lines than did more traditional coalition intelligence sources.

Yet it behooves us to remember that more traditional means of influencing expectations and popular support should not be overlooked due to a fascination with social media's potential. Knowing Iraqis were new to the process of democratic elections, General Brown recalled how officials recognized voters might not be tolerant of the inevitable delay between polls closing and results appearing on the street. Coalition members therefore hired individuals in the immediate aftermath of voting and gave them jobs such as painting curbs or others with similarly highly visible results. Related benefits included the opening of markets and a general sense of progress. Ben Espinosa described the difficulty of overcoming misperceptions regarding prevention or cures for Ebola. Counters included billboards and rap songs informing populations of the dangers inherent in touching corpses, not properly

preparing foods, and relying on family members for care in lieu of going to medical facilities.[55] His insights recall similar historical examples of innovation such as creating comic books with counterinsurgent heroes as proved successful in early 21st-century Philippines efforts to dissuade young males from joining insurgent groups.

[55] Espinosa also emphasized the necessity to break away from organizational norms when creating messaging, e.g., the U.S. military's "We are here to fight the insurgent, and the insurgent is the Ebola virus" did not settle well with many non-military audiences, to include some NGOs while also potentially exacerbating fears that soldiers were in West Africa to fight rather than assist the civilian population.

5. Megacities as systems and subsystems

> "The next pandemic is just an airplane ride away."[56]
>
> Captain Joel Montgomery

…and one can be all but certain that the airplane will land in a city. Chances are good it will be another Lagos or megacity given the tendency for these urban areas to count "primary transportation hub" among their many characteristics.

While *physical* infrastructure first comes to mind when we think of urban systems, *social* infrastructure is no less important, complex, and difficult to repair if broken.[57] The rate of construction in many megacities is dramatic. (Both the Republic of Korea and U.S. armed forces find that Seoul's inexorable spread impinges on training areas and other security-related terrain with unexpected swiftness. See Figure 5-1.) Yet it is the social infrastructure rather than the physical that evolves and adapts more quickly.

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[56] Joel M. Montgomery, (Captain, CDC), "Effective Reaction: Response to the 2014- 2015 Ebola Outbreak in West Africa," presentation given at the "MDB in Megacities" conference, Fort Hamilton, NY, April 4, 2018. For more on this phenomenon, see "'Pandemic' Asks: Is a Disease That Will Kill Tens of Millions Coming," National Public Radio, February 22, 2016, https://www.npr.org/sections/health-shots/2016/02/22/467637849/pandemic-asks-is-a-disease-that-will-kill-tens-of-millions-coming (accessed June 27, 2018).

[57] We will consider economic, political, religious, and any other infrastructure involving primarily human interaction as social for the purposes of these proceedings. Manmade physical and natural infrastructure (e.g., rivers or hills) will be considered "physical infrastructure."

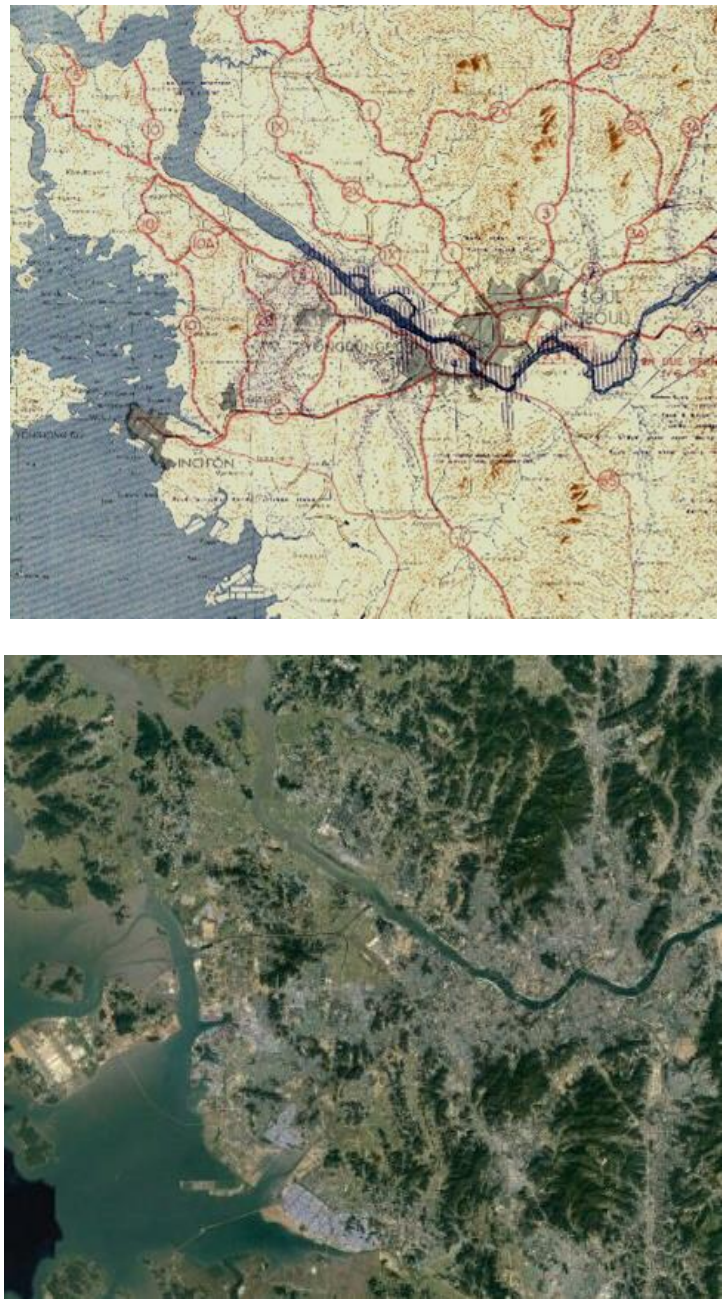

Figure 5-1: Geographical Spread of Seoul in 1953 (top) and circa 2007 (bottom)[58]

[58] Seoul 1953 image f courtesy of CW2 Scott R. Owens, 33rd Engineer Detachment, Eighth United States Army, Seoul, Korea. Seoul circa 2007 a Landsat/Copernicus image from Google Earth.

But to think of physical and social infrastructure as separate is to misrepresent urban reality. Baghdad hospitals in 1991 provide an effective example. Coalition bombing plans during Operation Desert Storm sought to avoid damaging the city's medical facilities in an effort to reduce the negative consequences of the campaign on its noncombatant population. Aircraft and cruise missiles instead struck electrical power generation, petroleum resources, and key transportation targets. Demonstrating the intertwining of physical and social, the result was doctors, nurses, and patients unable to get to medical facilities; lack of power to the spared structures; and inability to resupply. Targeting of the above also impacted water purification and sewage disposal. These facilities were likewise spared the bomb, but they could not function without fuel and electricity to power them. In March 1991, the month following the end of combat, the city's citizens were having to filter water before drinking or, when filtering was unavailable, drink untreated Tigris River water. Iraq's Ministry of Health advised its public to boil water before drinking, but boiling requires fuel, fuel many found unavailable.[59]

[59] This description of the effects of bombing targets in 1991 Baghdad during Operation Desert Storm draws on information provided to the author by Dr. Yuna Huh. Relevant citations underlying her research include Martti Ahtisaari, *Report to the Secretary-General on Humanitarian Needs in Kuwait and Iraq in the Immediate Post-Crisis Environment By a Mission to the Area*, New York: United Nations, March 20, 1991; Armed Forces Medical Intelligence Center [AFMIC], "Iraq: Assessment of Current Health Threats and Capabilities," AFMIC Assessment 05-91, November 15, 1991, http://www.gulflink.osd.mil (accessed September 9, 2002); "Bomb Now, Die Later," *Washington Post* Fog of War special, 1998, Vignette 10, www.washingtonpost.com/wp-

It follows that any coalition activities need to be considered in light of these complex and often far-reaching connections. The above examples address subsystems *within* an urban area. There are accompanying consequences *external* to a megacity or smaller urban area as well. Local, national, and broader dependencies disrupted by natural or manmade disasters reverberate outward from the urban area as do ripples of a stone thrown into a pond. Examples are myriad; two include (1) food and other necessities cannot be forwarded through damaged ports or airfields, and (2) essential transfers of money and other resources suffer interruption. In addition to these direct consequences, there are others particularly relevant to the greater reach and broader scope of activities found in larger urban areas. These are the equivalent of stones impacting not only the local pond but also others separate and often far-distant. Social media messages influence key populations and politicians continents away. (Farah Baker's "stones" impacted Palestinian, U.S., European, and other audience ponds.) Payments to meet time-sensitive obligations go unmet, the failures starting their own series of reverberations in commercial and social sectors.

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srv/inatl/longterm/fogofwar/vignettes/v10.htm (accessed September 15, 2002); Central Intelligence Agency, *Domestic Conditions in Iraq*, (Not Finally Evaluated Intelligence), https://gulflink.health.mil/declassdocs/cia/19960417/cia_70529_70529_02.html (accessed June 25, 2018); Jan August Davis and Robert Lambert, *Engineering in Emergencies*, London: ITDG Publishing, 2002; Harvard Study Team, "The Effect of the Gulf Crisis on the Children of Iraq," *New England Journal of Medicine* 325 (1991): 977-80; and Anthony Shadid, "War Would Crush Iraqi Cities, Analysts Say," *Boston Globe*, October 20, 2002, 1.

An apt metaphor is a pool table on which we might consider a rural environment as being replicated by two or three numbered balls on the surface along with the cue ball. A player striking the cue ball might (or might not) hit any one of the numbered balls, but if he does the effects are fairly easy to determine. Now consider a city of one million people as a rack of numbered balls scattered about the surface. Striking the cue ball is likely to impact several directly with those starting a series of additional effects quite difficult to determine in their entirety. Our megacity of ten, fifteen, or more million residents means an equal number of complete racks strewn across our felt landscape. The consequences of a solid strike of the cue ball are hard indeed to track much less determine before the blow of the cue tip. So it is with decisions and resultant actions of a coalition in a megacity.[60]

A coalition nonetheless must take what steps it can to increase the likelihood of its actions supporting sought-after objectives. Understanding what is (or was, prior to a disaster) "normal" in terms of the megacity's routines – the "hum" of daily life – will be a significant step in that direction. Part of this "normal," "hum," or "routine" is

60 Dietrich Dorner offers an alternative, albeit a somewhat more complicated one: "We can liken a decision maker in a complex situation to a chess player whose set has many more than the normal number of pieces, several dozen, say. Furthermore, these chessman are all linked to each other by rubber bands, so that the player cannot move just one figure alone. Also, his men and his opponent's men can move on their own and in accordance with rules the player does not fully understand or about which he has mistaken assumptions. And to top things off, some of this own and his opponent's men are surrounded by a fog that obscures their identity." Dietrich Dorner, *The Logic Of Failure: Recognizing And Avoiding Error In Complex Situations*, NY: Basic Books, 1997, 42.

General Townsend's flow: flow of power, electrical and petroleum-based to be sure, but also economic, social, political, security, cultural, and other types. As with other elements of a megacity environment, understanding the impact of disrupting, preserving, or in any way altering these flows will have consequences with consequences. Better for a coalition to have an understanding of flows or what is "normal" before taking actions that directly affect them or do so via second- or higher-order effects (our numbered balls colliding with others).

Urban areas also introduce additional complexity when determining centers of gravity, decisive points, and key terrain; megacities multifold magnify that difficulty.[61] Those vital elements may be physical, social, or involve interactions between the two. They might be directly effectible or only influenced via second- or higher-order effects. Insights from speakers Montgomery, Hake, Fink, and Espinosa have application here. Let us return to our previous counterfactual inspired by Sheri Fink's comments. Imagine Ebola-carrying Patrick Sawyer making it through Lagos

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[61] Center of gravity: The source of power that provides moral or physical strength, freedom of action, or will to act.

Decisive point: A geographic place, specific key event, critical factor, or function that, when acted upon, allows commanders to gain a marked advantage over an enemy or contribute materially to achieving success.

Key terrain: Any locality, or area, the seizure or retention of which affords a marked advantage to either combatant.

Definitions are from the *DOD Dictionary of Military and Associated Terms*, April 2018, http://www.jcs.mil/Portals/36/Documents/Doctrine/pubs/dictionary.pdf (accessed July 2, 2018), 32, 63, and 134 respectively.

airport, resting in his hotel, and later joining his scheduled meetings. With many more exposed and risk of millions falling ill, who receives priority for available prophylaxis and care? In Dr. Fink's words, "the most vulnerable are the ones who suffer most." Yet not granting top priority to medical practitioners who can treat others or those able to mobilize vital resources means less effective efforts to stop the spread of disease. It is also worth considering that essential resources might be outside the expanse of a megacity, e.g., reservoirs providing potable water or power generation facilities.

Every contingency will be unique, but individuals who have trained to understand these environments will be far better prepared than neophytes. They will be the ones best able to recognize value in monitoring social media not only to determine where problems are greatest but also the nature of those problems and what misinformation might be building a tide of panic that early counteraction could dampen. Through this all will be the need to balance long- and short-term goals to minimize tomorrow's negative consequences of a decision that makes eminent sense today. Or, more desirably, selecting a course of action today that enhances the likelihood of better outcomes weeks, months, or years in that future. Doctrine, training, and exercises contemplating future operations will have many factors to roll into their considerations. Dr. Joel Montgomery provided a sample of those influencing the proliferation or containment of disease in a megacity:

- Trade
- Regional disparities in infectious disease burden
- Population mobility

- Climate change
- Changing ecology and growth of urbanization.
- Inadequate water supply
- Suboptimal sanitation infrastructure
- Population density, to include the existence of and conditions in slums.[62]

In addition to preparations that include doctrine development, training, and exercises is the aforementioned necessity to establish key relationships today that will minimize inefficiencies in deploying resources tomorrow. As one speaker offered, "You have to have the network before you need the network."

The challenges inherent in megacities as systems and subsystems justifiably seem daunting. They are not insurmountable. Good preparation is a solid start. So too is recognizing the impossibility of predicting future crises while being able to forecast something of their characters. "Prediction" in this case implies being able to accurately foresee the future in great detail, to be able to discern the what, where, and when before events. "Forecasting" as used here is less demanding. It is recognizing the types, possible magnitudes, and more likely locations of events along with other helpful traits that permit preparations in the absence of unattainable detail. To draw on a sports metaphor, no defensive player knows exactly what the outcome of a batter's trip to the plate will be during a baseball game (or, given our partnership with

[62] Joel M. Montgomery (Captain, CDC), "Effective Reaction: Response to the 2014- 2015 Ebola Outbreak in West Africa," presentation given at the "MDB in Megacities" conference, Fort Hamilton, NY, April 4, 2018.

the Australian Army during this event, that of a batter on a cricket pitch). Yet a study of previous events and practice increase the chances of defensive success by positioning players where history tells them the ball is more likely to come. Similar consideration of historical events, likely developments, and drawing on lessons from operations in other environments can better ready organizations for contingencies yet-to-come. These include capitalizing on a megacity's preparations for natural disaster when planning for other types of natural or man-imposed crises (such as earthquake preparations in Los Angeles or Tokyo).

6. Training for Megacity Multi-Domain Operations

Technology developments will undoubtedly assist in preparing for, conducting, and moving forward from Multi-Domain Operations in tomorrow's megacities. Yet mentions of technology were rarer than might have been thought before the conference. The headers for the previous chapters identify those topics granted greater attention: mission command, social media and other information/cyber concerns, urban areas as systems, and that most emphasized: the need for cooperation and melding various organizations' capabilities to achieve convergence. To these are added two that span the set and comprise this and the following chapter: training and intelligence requirements.

Training for urban-related tasks at the tactical level has long been a priority, albeit one given inconsistent emphasis. Still, well-developed and improving sites at the U.S. Army' National Training Center; Joint Readiness Training Center; and Muscatatuck, Indiana; and the United States Marine Corps' Twentynine Palms facility, are among those available to U.S forces. Multinational partners have others of similar quality. There is room for further improvement, in particular replication of high-rise city cores, realistic simulation of the urban populations' size, and – as noted by General Townsend – duplicating urban flows. Similarly, representation of urban challenges in support of virtual or constructive training fall well short of requirements. What is all but completely lacking is training addressing challenges at the operational and strategic levels, whether in the form of live exercises or with augmentation by or exclusive reliance on models and simulations. Here too there exists the requirement to

train and exercise participants with respect to determining what is an urban area's routine, its power relationships, the implications of the megacities as a system and subsystem, and much else.

Existing moves in the right direction include a call for an Australian Urban Strategic Studies course as identified by MAJGEN Burr; U.S. Department of the Army "broadening seminars," and that organization's Asymmetric Warfare Group's creation of a dense urban terrain detachment based in Fort Hamilton, New York. (Though the last's focus on only dense urban terrain suggests primarily tactical rather than broader offerings, objectives include providing an understanding of decisions' and actions' operational and strategic implications.).[63] What is called for, multiple attendees in New York noted, is regular gatherings of those with relevant expertise from the academic world; local, state, and federal governments; others with experience at those operational and strategic levels; and additional parties as appropriate. These events would have the additional benefit of offering opportunities to establish and maintain the habitual relationships called for above. Introducing megacity MDO considerations into CAPSTONE or other training for senior leaders merits consideration.[64]

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[63] For more on the Australian Urban Strategic Studies course proposal, see Michael Evans, "Urbanization's challenge to strategic studies in the 21st century," International Committee of the Red Cross, April 11, 2017, https://www.icrc.org/en/international-review/article/future-war-cities-urbanizations-challenge-strategic-studies-21st (accessed May 25, 2018).

[64] The CAPSTONE course objective is to make newly selected generals and admirals in the U.S. military "more effective in planning and employing forces in joint and combined operations." Its "curriculum examines major issues affecting national security decision making, military strategy,

How can we identify those with the needed expertise when the specifics of which megacity we might deploy to have yet to become apparent? The U.S. has regionally aligned forces, state partnership programs, and special operations units that return time and again to the same areas and have established relationships with partner nation personnel. Embassy and other governmental representatives (DOD and otherwise) have continuous contact with host nation counterparts and can provide valuable insights. They are in most cases stationed in capitals that are often primate if not megacities. G2 TRADOC has several programs, its Global Cultural Knowledge Network and Mad Scientist initiatives among them, that actively cultivate such experts. Readiness for potential operations could be dramatically enhanced were we to introduce a program to capture these various individuals' and organizations' knowledge, accompanying it with that available in cooperative NGOs, IGOs, and industry representatives. Understanding what potentially helpful databases or avenues to social media interactions are available *prior* to a contingency further pre-positions a coalition for success. Dr. Fink made clear the value of a social media map identifying parties likely to need assistance in times of disaster or crisis, as she did also the need to understand potential sources of societal disruption, stress, or causes of population displacements. This knowledge and access need not be – should not be – limited to that relevant to armed conflict alone, but also to the competition and return to competition components of MDO. "Making practice harder than the game"

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joint/combined doctrine, interoperability, and key allied nation issues." "CAPSTONE General and Flag Officer Course," National Defense University, http://capstone.ndu.edu/ (accessed July 2, 2018).

demands the toughest challenges be confronted before crises to the extent possible, e.g., Sheri Fink's broader question, "How do we triage an entire city?" Addressing these challenges will be nigh impossible unless a comprehensive approach to training, planning, and exercises as well as actual operations becomes the norm.

7. Intelligence Considerations during Multi-Domain Operations in Megacities

> **In planning an urban response, know what you want to achieve, and when you will leave.** Cities often have extremely high levels of chronic poverty and poor service provision – it can be difficult to tell when an "emergency" ends and "normal" conditions begin.[65]
>
> "Responding to Urban Disasters: Learning from Previous Relief and Recovery Operations"

Discussion above, and recent experiences in urban areas worldwide, make it only too clear that intelligence requirements in support of megacity Multi-Domain Operations will extend well beyond the traditional need to understand a foe's capabilities and intentions. Given that contingencies not involving an adversary are the more likely (e.g., post-natural disaster humanitarian relief) or that a coalition faces others in which noncombatant concerns take precedence even should combat be involved, the hunger for information will have a breadth demanding much of all participants. That demand will include a number of implied if not specified tasks. First, much of what will be valuable can be and should be collected prior to a coalition's entry into a theater in

[65] ALNAP, "Responding to Urban Disasters: Learning from Previous Relief and Recovery Operations," ALNAP Lessons Paper, April 2014, https://www.alnap.org/help-library/responding-to-urban-disasters-learning-from-previous-relief-and-recovery-operations (accessed July 2, 2018). Emphasis in original.

order to establish a basis for understanding the aforementioned flow, power, and what constitutes "absence of the normal and presence of the abnormal." Fortunately, a considerable amount of this material will be available from the internet, public records, and via databases or other resources. Second, and again derivative of our discussion above, knowing how all the parts fit together, work together, and are likely to be influenced by the arrival of outsiders will be key – that understanding of second- and higher-order effects for which the pool table is a metaphor. Fortunately the resources at hand in a megacity outnumber those in any other environment. Residents of an urban area have two eyes, two ears, and multiple means of providing insights and observations to outsiders who would find them valuable. It is therefore crucial that a coalition ensure these millions of potential information providers know (1) what information is needed, (2) who needs it, (3) how to get it to the right parties, and (4) to provide feedback to those offering input. (The last is vital if the coalition hopes to perpetuate participation from a population. Without it, those providing information will see no consequences of their service and cease efforts.)[66] The challenge as articulated by GEN Brown: an increasingly familiar spin on Carl von Clausewitz's "fog of war" that the Prussian described as "the general unreliability of all information.... [A]ll action takes place, so to speak, in a kind of twilight…like fog or moonlight."[67] Practitioners of megacity MDO will find discerning reality from otherwise not only hindered by Clausewitz's concerns, but also the unprecedented

[66] These four elements are adopted from points made by counterterrorism expert Brian Jenkins.

[67] Carl von Clausewitz, *On War*, Princeton, NJ: Princeton University Press, 1976, 140.

volume of information and its manipulation by various parties to suit their ends. In General Brown's words, "the 50 billion things" available on the internet will result in a haystack of information in which the needles are well buried.

Enter artificial intelligence (AI). Like the old joke about "I don't need to outrun the bear. I just need to outrun you," AI superiority is likely to be a relative quality, one with segmented rather than absolute. Stated in another way, is improbable that any competitor will dominate all facets of AI. Achieving "AI supremacy" is unlikely but we might well find that we or others can achieve "AI superiority" in terms of one or more functions or cognitive arenas. In yet other realms we might find ourselves competing to gain, maintain, or regain the initiative akin to the improvised explosive devices action-reaction-counteraction process familiar from operations in Iraq and Afghanistan. AI during MDO in a megacity will be a means of getting there first with the most in the way of mining the valuable ore from the plentiful databases in the world's largest urban areas. Artificial intelligence should assist with the tough decisions highlighted by Dr. Fink: determining who gets aid first, how the most vulnerable might be identified prior to a coalition's arrival, and what resources and capabilities should have top priority for delivery at airfields or ports. Our ability to design AI to better assist in this regard can learn today from existing "predictive policing developments," as one speaker put it. We mean this not in the science fiction (and somewhat disturbing) nature of the movie *Minority Report*, but instead in molding available data with human judgment and empathy to capitalize on features such as facial recognition and license plate readers. How, GEN Townsend asked, can we link these many disparate data sources in the service of coalition objectives? One

of the more difficult challenges will be properly focusing pre-arrival research and linking its results to on-the-ground contacts so that we can identify who legitimately speaks for given elements of a population (rather than relying on the easy but often inaccurate decision to depend on those able to speak our language). “The people” or “the population” in a megacity are anything but homogeneous, making that identification one of determining who speaks for various physical neighborhoods; ethnic, economic, religious, and other social groups; formal and informal jurisdictions; and those local, regional, and more widely international parties whose interests are inextricably tied to the urban area in question. That each of these and other groups are intermixed and overlapping further makes the complicated complex. Similar to General Townsend’s point, General Brown questioned whether we were taking advantage of emerging resources to the extent possible, ones we may not know exist barring preliminary reconnaissance or coordination with host nation representatives. Seoul has some 250,000 cameras, arguably a factor in maintaining the city’s notably low crime rate. Recognizing such potential assets suggests once again reminding ourselves that convergence should incorporate more than military considerations alone. History is another potential resource in this regard. Public and private facilities failed during Hurricanes Katrina and Sandy because of poorly-located power infrastructure. While some generators were located above flood levels, circuit breakers and other components linked to these backups were inexplicably not. (The Fukushima Daiichi nuclear power plant also had reserve power capabilities flooded by tsunami waters in 2011.) Just as emergency planning before and initial reconnaissance after a disaster should identify resources such as privately-owned

boats, buses, building supply storage locations, and other assets as appropriate, greater efforts to ascertain likely failure points could preclude or mitigate the consequences of a megacity crisis. A coalition should additionally be on the lookout for unexpected benefits. Sheri Fink noted how Ebola survivors became “force multipliers” in West Africa when it was realized that their resultant immunity made them valuable hires who could work at little risk and for longer hours than those in protective suits.

8. Important but not preeminent: Technology during Multi-Domain Operations in megacities

> Technology is one of our country's greatest assets, but it is also one of our biggest vulnerabilities when the technologies fail.
>
> Sheri Fink

Technological capabilities underlie many of the above observations: computers enabled by artificial intelligence assist leaders' decision-making processes in real time; virtual reality and other synthetic systems enable replication of the urban environment for mission planning and rehearsals; and communication systems and procedures are hardened while enabling better interoperability with partners. Technology might prove the first sphere that shatters land-sea-air-cyber-space stovepipes. Perhaps a future joint task force commander will be able to assist logisticians by employing cyber and space to isolate those areas in a megacity unwilling to comply with coalition dictates, denying them comforts while rewarding those sharing nice-to-have resources. Such areas could be within the urban area itself or others more or less dependent on city functions (or, in turn, on which the city is dependent). The inevitable perversion of narratives and inciting false information might one day be screened, tagged, or otherwise hindered by AI to mitigate its counterproductive effects. Better – and always – viewed from a systems perspective, technology is less *the* solution than a component *of* solutions during megacity MDO.

9. Recommendations

Speaker presentations and discussions resulting from question and answer periods motivated both obvious recommendations and others subtler. Speakers emphasized the role of innovation: using increasingly pervasive cameras in ways heretofore unconsidered and identifying those and other resources in combination with databases to steal a march during competition, armed conflict, or return to conflict operations. Several of the recommendations below build on the importance of original thinking…or capitalizing on previous insights yet to be acted on.

Expand our understanding of what constitutes a coalition to better orchestrate relevant capabilities

Working with traditional and less traditional partners will be basic to success during megacity MDO innovation. General Brown's observation that the army is designed to operate on rural terrain implies – no, makes obvious – that its personnel will have much to learn from the insights of individuals and partners able to "walk around the table" and view challenges from perspectives different experiences and expertise provide. We might suppose the fundamentals of coalition building will remain unchanged. But knowing how to orchestrate the capabilities available from organizations voluntarily involved (and thus likely less amenable to subordination) requires talents few military or other governmental leaders have opportunity to cultivate. Achieving desired convergence will mean more than orchestrating resources. Communicating reasonably consistent messages (or "strategic narratives"

in the currently popular jargon) will also be crucial to gain and maintain popular trust and support. Synchronizing actions in support of various organizations objectives in the present will be difficult. Also working toward making these immediate objectives likewise support longer-term goals introduces a quantum level of greater difficulty. Longer-term solutions will require thinking deeper in time than has often been the case previously. That will prove challenge enough yet harder still when "deeper in time" is years or decades for megacity political authorities and distantly located economic interests but only weeks or months for many other participants. The concept of working toward a desired end state takes on the character of a wicked problem when myriad parties have equally myriad views of what those ends should look like.[68]

[68] Wicked problems "inherently have no 'right' or 'correct' solution [and are] resistant to resolution…. Because of complex interdependencies, the effort to solve one aspect of a wicked problem may reveal or create other problems…. There is no definitive formulation of a wicked problem…. Solutions to wicked problems are not true-or-false, but better or worse, [and] every solution to a wicked problem is a "one-shot operation" because there is no opportunity to learn by trial and error."
Wicked problems also depend on one's perspective; what is a wicked problem for one individual or group might be of no concern or pose no difficulties for another with different concerns. Further, as the nature of a wicked problem is revealed only as one wrestles with it, traditional approaches for defining their elements, conducting analysis, and finding a solution do not work. Were all this not enough, there is a subclass of wicked problems known as super wicked problems characterized by (1) limited time to deal with them, (2) absence of an overall, single central authority, and (3) a Heisenberg-type situation in which those attempting to solve the problem are also influencing its character, all conditions with which military, disaster relief, and political leaders are aware. Elements in this quotation and subsequent discussion are from Horst W. J. Rittel and Melvin M. Webber, "Dilemmas in a General

Perhaps such end states will have less application when planning operations in a megacity. Perhaps working toward *a desired end state* must instead give way to *a series of interim end states* much as some believe the case is for Israel today given the seeming impossibility of agreeing on a single, long-term objective when conditions in Gaza, the West Bank, and southern Lebanon are ever volatile.

Develop a training strategy for megacity operations

Operational and strategic level training that brings together those likely to actually represent coalition partner organizations is rare if at all existent. The challenge is a significant one. Such exercises demand those among the senior-most leaders in government organizations, NGOs, IGOs, industry, and informal groups such as neighborhood associations. These events will not be successful if they have to spend time bringing participants up to speed. Preliminary readings, video offerings, or other means of getting them to a common starting point prior to collective training sessions should allow teams conducting the exercise to quickly delve into vignettes that assist in identifying ways to overcome obstacles to success, e.g., finding common ground in terms of issues such as information sharing, means of providing guidance when both hierarchical and less vertical structures come together, and inter-organizational sharing of resources under conditions of restricted port and airfield capacity. An important note here: previous training strategies providing guidance for tactical level

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Theory of Planning," *Policy Sciences* 4 (June 1973), 160; and "Definition – Wicked Problem," http://brevard.ifas.ufl.edu/communities/pdf/SF_Wicked_Issues_Background_Defined_Reading.pdf (accessed November 2, 2016).

readiness, to include that specific to given urban terrain types (e.g., dense urban environments such as high-rise cores, slums, or subterranean complexes) are at best complements to preparations needed for operational and strategic level proficiency and not replacements therefor.

A training strategy based on a "building block" approach merits consideration, one in which leaders at all levels are provided the materials necessary for understanding their role and that of their organizations during the full spectrum of possible contingencies that might befall a megacity. Coalitions could then bring these building blocks together via as-yet-to-be-crafted models and simulations allowing for dispersed training and other events combining tactical, operational, and strategic level challenges in live exercises akin to Return of Forces to Germany (REFORGER) undertakings as conducted during the Cold War. There are examples on which to build. Los Angeles used the 2000 Democratic National Convention to exercise emergency response capabilities. Other urban areas' preparations for natural disaster response likewise provide a ready framework on which to construct exercises that encompass those and broader challenges. Conducting these events will allow outside providers to better understand in-place response structures and procedures and how they can most effectively bring their own capabilities to bear. Training should provide the opportunity to emphasize the above-noted need to plan deeply in time, balance near- and more distant-in-time objectives with coalition members, and determine how Multi-Domain Operations can better orchestrate activities (to include situations in which the military is not in charge or a transition of leadership is called for). These events will also be opportunities to identify seemingly mundane but critical

operational and strategic level issues such as how to maintain communications between the many coalition member organizations when hardware and software are not inherently compatible. One goal in these efforts: turning actions such as General Townsend's two to three-week effort to identify enemy alternate command posts into a matter of minutes or hours.

Chief Leonard of the FDNY observed that military assistance provided during megacity operations will in many cases be primarily if not exclusively a matter of providing logistical support. He estimates that his department would be able to sustain operations for three to five days during a major crisis after which it would require assistance from the military. Exercises should incorporate, even emphasize, such likely requirements. These would find the armed forces in a subordinate or cooperative rather than leadership role, perhaps throughout the area of operations, possibly in some areas while the military is elsewhere in charge given appropriate circumstances or missions.

Calls for "an interagency Goldwater-Nichols Act" are not new.[69] Regardless of one's personal evaluation of how much the act has benefited inter-service cooperation, it has at a minimum improved joint understanding. An equivalent for interagency/

[69] The Goldwater-Nichols Act directed introduction of a number of Department of Defense education, personnel assignment, and other requirements with the objective of improving inter-service understanding and cooperation. See Goldwater-Nichols Department of Defense Reorganization Act of 1986, public law 99-433, October 1, 1986, https://history.defense.gov/Portals/70/Documents/dod_reforms/Goldwater-NicholsDoDReordAct1986.pdf (accessed July 2, 2018).

whole-of-government could be similarly helpful, but increased exchanges between these organizations is possible without the formality of a law. There is no reason similar flexibility could not also permit inclusion of NGOs, IGOs, and even private enterprises. Formal postings of a year or more could have complements in internship-type exchanges of equal or lesser duration. Taking advantage of National Guard and Reserve relationships would expedite initiation of these programs. The U.S. Army is establishing a cell at Brooklyn's Fort Hamilton that will incorporate the efforts of the New York Army National Guard, U.S. Army's Asymmetric Warfare Group, and key elements of New York City's government infrastructure to support training of personnel from throughout the service. Including individuals from all components of the service – and possibly other services in addition – as members of that cell or in positions with the NYPD, FDNY, and other parts of the megacity's governmental infrastructure is an example of what could be done in other megacities around the United States and worldwide. Other possibilities might see commissioned and noncommissioned officers inserted into megacity emergency operations centers and planning groups. Functional exchanges would lend a reservoir of knowledge and experience to services, e.g., Corps of Engineer personnel working with city planners or infrastructure managers. Jim Hake and others noted, however, that such valuable opportunities may require removal or modification of legal, structural, personnel management, and other regulatory obstacles.

General Brown added that the services need to also do a better job of leveraging expertise found in academic institutions. The above exchanges, assignments, and exercises would undoubtedly prove beneficial, but training built on a foundation of

education will be more valuable yet. Reading, lectures, and other forms of professional development that take advantage of the quite robust extent of material on urban environments, systems management, city planning, and other disciplines provide context for better understanding when an individual is later immersed in an assignment. A systematic approach to both education and training would incorporate the following among additional resources:

- academic; military/police/fire/coast guard/any pertinent lessons learned;
- resources regarding megacity disasters such as Sheri Fink's *Five Days at Memorial* and events such as the 1995 sarin nerve agent attack in the Tokyo subway as described by Haruki Murakami in his *Underground*;[70]
- historical case studies;
- current and emerging doctrine and concepts;
- best practices from nongovernmental and intergovernmental organizations;
- general consolidation of open source databases on megacities.

Breaking bad training habits

Innovation sometimes requires little other than simply breaking bad habits. The military preoccupation with "tidiness" can interfere with effective training. General

[70] Haruki Murakami, *Underground: The Tokyo Gas Attack and the Japanese Psyche*, NY: Vintage, 2001.

Townsend decried the tendency to sterilize urban training sites after a unit's rotation. "Leave it," he advised when observing that the aftermath of trash, debris, rubbled buildings, and similar unsightly refuse better replicates conditions in many megacities than do sterile building interiors with picture-perfect furniture arrangements or parade-ready streets. So too, training must recognize the at times unavoidable psychological ugliness of operating in densely populated environments. Despite the finest crafting of rules of engagement and valiant efforts to avoid injuring – much less killing – noncombatants, soldiers on the ground and pilots in the air need to confront situations in which innocents will be unavoidably put at risk. Avoiding such casualties will be helped by confronting the possibility of their occurrence before actual operations. So too, the potential for or severity of post-event psychological consequences might be mitigated by exposure to such situations during properly designed training. Leaders at higher echelons, to include those at the operational and strategic levels, similarly need to be exposed to these difficult challenges. General Townsend suggested that the army's under-development Synthetic Training Environment (STE) must allow for immersing those leaders in megacity conditions. Such immersion is essential whether the training is live, constructive, or virtual. He went on to observe that this will at times require training in actual cities. The objective: soldiers prepared physically *and* psychologically for violence resulting from combat in urban environments.

When feasible, adapt from the familiar as you innovate

Megacities will be among the most difficult of operational environments in which coalitions find themselves. Yet more often than not the requirements will be sufficiently familiar that the wheel need not be reinvented. Combined arms and joint planning will provide effective means of merging the capabilities less traditional coalition partners. Planning processes, rehearsals, drills, communications, intelligence collection and dissemination: these are among the functions with which a military approach can offer much to other organizations while simultaneously providing windows on potentially evolutions to those processes. Centralized planning and decentralized execution will be the norm. Mission command will help but command and control procedures will have to adapt. Evolution will be the norm, but there will be times when we will not simply seek to improve existing systems but will find value in replacing them. General Brown and Jim Hake used the metaphor of high jumping and its evolution to make this point, Hake adapting Brown's concept (top of figure) to emphasize how new partners can assist each other in bringing about needed change (bottom image in Figure 9-1).

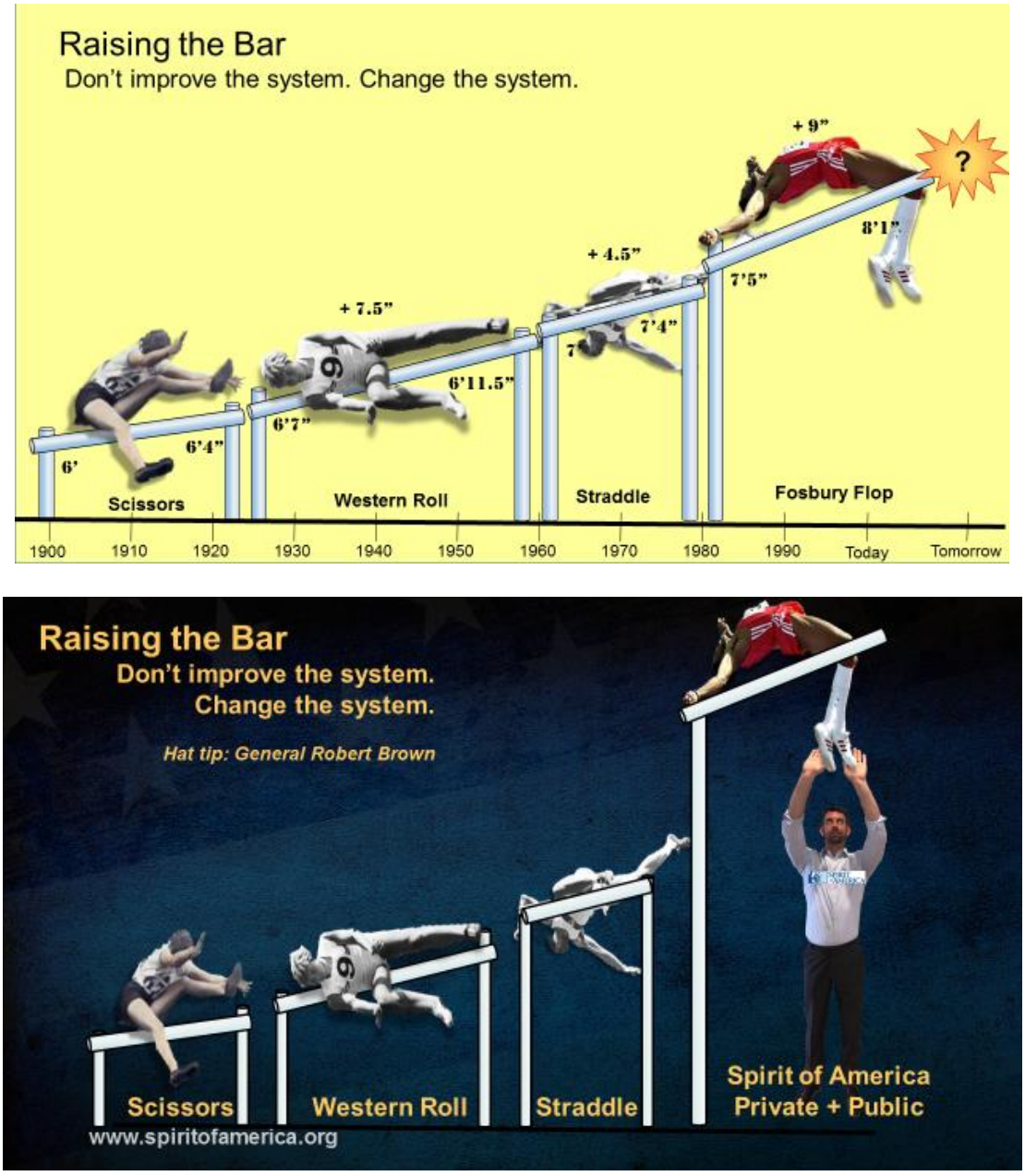

Figure 9-1: System change in the service of MDO in megacities

A question provided by audience members is pertinent to this recommendation: Will coalitions be "required to switch between orchestration and self-organization?"[71] The complexity of megacities very likely makes the answer "yes"…or, more likely they will find themselves needing to do both simultaneously. How to do so presents another training challenge for leaders at all three levels of war/conflict.

Recognize that combat operations are only one segment along the Multi-Domain Operations in megacities spectrum.

Notably, the Australian Army has but one of its five designated lines of effort (LoE) exclusively committed to combat operations: joint land combat (the other four being population protection, information actions, population support, and indigenous capacity building). The service's emphasis on other-than-combat in no way diminishes wartime preparation. Instead, it emphasizes the criticality of readying for the full spectrum of missions, many of which inherently demand convergence with other organizations' capabilities. That the active force regularly assists – even conducts primary planning – during natural disasters within Australia reinforces recommendations made by MAJGEN Burr and others during the New York conference: future training events should incorporate representatives from more than the armed services. And the level of representation needs to be in keeping with the character of the expected demand when MDO meet megacity: substantive, not merely

[71] P.G.M. Scheepstal and H.J.R. Oerlemans email to Dr. Russell W. Glenn, Subject: "observations MDB," April 13, 2018.

cosmetic. GEN Townsend expanded on this observation, stating that other government agencies (OGAs), NGOs, and IGOs should be part of teams during the development of megacity and other urban operations-related models and simulations. Acting on the knowledge that missions other than those directly involving combat will help when seeking to determine what partner organizations can bring to the table. Focusing on combat alone will conceal the need for non-military capabilities. It is worth remembering that much of – likely the vast majority of – the population in a megacity will not be experiencing the trauma of combat first-hand given the size of these features. That does not mean citizens will not have already suffered travails as fighting moves out of their neighborhoods or that they have avoided being deprived of essential resources due to armed conflict impeding delivery of essential services. (The same is true of contingencies involving natural or other manmade disasters, of course.) Coalition leaders must recognize that various parts of a megacity's population will experience the trio of MDO components – competition, armed conflict, and return to competition – simultaneously much as they would the three components of Krulak's three block war.

Jim Hake noted that NGOs such as his own should not be expected to replace normal logistics systems during operations. Better that they be viewed as providing "gap filling measures." Just how these organizations – or others from the IGO, commercial, or community services arenas – can do so will go unaddressed if training and exercises too greatly focus on armed conflict alone.

An additional benefit of looking beyond combat and demands pertaining exclusively to the military: leaders from all coalition members will better recognize what

information they need and can obtain from others while seeing in turn what they might provide. Likewise, conducting events focused on non-combat contingencies will increase the chance of organizations otherwise hesitant to participate in training doing so when invited, thereby offering opportunities both to have them recognize the essentiality of working with the military and establishing initial contacts on which parties can later capitalize. An example cited during the conference: *Médecins Sans Frontières* (MSF) did not originally want to work with the U.S. military during Ebola epidemic operations in 2014 West Africa. Fortunately, conditions mandated these parties come together in the service of population welfare and each organization's objectives. The result was recognition of and an appreciation for the benefits of cooperation.[72] Whether the military leads or supports during future MDO in megacities undertakings will depend on the conditions at hand. Coalition and other partnership leadership could change over time as those conditions evolve, passing from military to civilian, vice versa, or finding armed forces ever in a supporting rather than leadership role. Inherent in this recommendation is development of heretofore underdeveloped or nonexistent joint, interagency, and broader comprehensive approach doctrine that incorporates lessons from past operations, exercises, and, eventually, operations yet to come.

[72] Benjamin Espinosa (Commander, USN), "Operation United Assistance: The Department of Defense Response to the West African Ebola Virus Epidemic," presentation given at the "MDB in Megacities" conference, Fort Hamilton, NY, April 4, 2018.

All this once again reinforces the need to innovate in expanding MDO training the better to:

- encompass operational and strategic considerations,
- recognize the complexity of operations when conducted in megacities, e.g., challenging those undergoing training by including complex scenarios that demand MDO's application during contingencies in which armed conflict, disease outbreaks, stability concerns, displaced persons, and other potential events occur simultaneously,
- recognize the essentiality of accepting innovative thinking in approaching these challenges.

Innovation could also encompass tailoring existing doctrinal concepts to better address pending challenges. Maneuver, currently defined in U.S. joint doctrine as the employment of forces "in the operational area through movement in combination with fires to achieve a position of advantage in respect to the enemy," would see a beneficial broadening, an expansion that retains all aspects as implied in the above definition but one that in addition recognizes that (1) capabilities relevant to achieving objectives during MDO will require more than fires and movement alone, and (2) gaining advantage with respect to parties in addition to the enemy (or in lieu of the enemy when armed conflict is not part of an operation) will at times be of greater importance to objective accomplishment than defeating a foe. Given this overdue evolution in the face of recent contingencies and MDO's emergence, maneuver

becomes "the employment of relevant resources to gain advantage with respect to select individuals or groups in the service of achieving specified objectives."[73] Such revision is in keeping with several conference speakers who emphasized what we might call "innovative adaptation" rather than assuming that originality always requires casting aside the proven and familiar in favor of creation. Invention will have its place in confronting the complexity that characterizes the application of MDO in a megacity, but every scenario will also possess no little that is familiar.

Develop information operation procedures for Multi-Domain Operations in megacities

The second- and higher-order effects metaphor of balls on a pool table is nowhere more appropriate than in terms of information operations in a megacity. The density of residents and means available for communication means information travels at hypervelocity (often far faster than the speed of fact as our Churchill quote makes clear). Long recognized as an arena in which the U.S. competes less effectively than is desirable, competition in the information realm during MDO in megacities will be an exceptionally challenging case that merits particularly innovative thinking and adaptation. This will require a blending of legal insight, media representatives'

[73] Those wishing to read more regarding the redefinition of maneuver can access Russell W. Glenn and Ian M. Sullivan, "From Sacred Cow to Agent of Change: Reconceiving Maneuver in Light of Multi-Domain Battle and Mission Command," *Small Wars Journal* (September 20, 2017), http://smallwarsjournal.com/jrnl/art/from-sacred-cow-to-agent-of-change-reconceiving-maneuver-in-light-of-multi-domain-battle-an (accessed June 5, 2018).

cooperation, and assistance from those members of the public who are social media producers and consumers…in other words, another example of the broader-than-traditional collective of formal and informal memberships that will characterize MDO during contingencies to come. Much in the way of cooperation between the services and fifth estate will be called for in order to avoid putting soldiers at risk. There will be newcomers to this cooperative: social media users who complement and for some audiences take the place of formal media functions as did Farah Baker during Operation Protective Edge. The intentions of some will be legitimate; some will be otherwise. Here again, experimentation, exercises, and consistent interaction are called for in the search for solutions.

When appropriate, develop information strategies first and then develop a scheme of maneuver to support

Our information strategies are usually successors to scheme of maneuver development. Learning from the Russians and others, we should consider reversing the process when situations dictate, situations more likely when operations are in densely populated terrain. Operations in a megacity may be population-oriented, the end state from which one backward plans therefore being defined in terms of informing, influencing, or otherwise interacting with an individual or group. Provision of aid and services would see physical activities in support of an information campaign. It is not unforeseeable that combat operations might be among these supporting activities. Bringing kinetic capabilities to bear in the service of those non-

kinetic may be called for just as non-kinetic have historically served kinetic operations.

Intelligence activities in support of these campaigns will involve less traditional foci. These might include identifying which NGOs are key to achieving coalition ends, locating relevant subject matter experts both in the area of operations and beyond, and gaging what means will prove most effective in communicating with megacity residents and workers (radio? television? individually or group-targeted cellphone messages? Twitter?). That previously mentioned heterogeneity of megacity populations suggests the answers will differ by ethnic group, neighborhood, and economic sector.

Linear approaches will fail when orchestrating capabilities in all domains. The inherent complexity of megacity Multi-Domain Operations demands constant adaptation to evolving conditions and frequent revalidation that assumptions remain valid. Collection will involve a combination of traditional means – patrols, imagery, communications monitoring, and more – in partnership with taking advantage of resources less available historically – city government and health system databases, for example.

Develop communications capabilities supportive of a comprehensive approach to operations

Joint – and at times intra-service – communications remain a challenge for the U.S. military. Ground force communications with various aviation platforms or naval vessels remain problematic, for example. The consequences can be severe as the

instance of aircraft dropping munitions on a U.S. Army brigade headquarters during Operation Urgent Fury in 1983 Grenada demonstrates, this in an urban area of miniscule size compared to many in which soldiers will find themselves in the future.[74] That compatible inter-service communications will be fundamental to the success of MDO goes without saying. Less apparent but elementary to megacity contingencies is a similar call for the ability to interface with other government and other-than-government partners to maximize operational efficiency. Cell phones and additional unsecure means will suffice for most communications during operations absent a foe (though even in these situations some protection from intercept by criminal or other unfriendly groups will be desirable). More secure means will be called for when the environment includes combat. The number of partners will quickly overwhelm organizations' abilities to provide liaison officers provided the equipment necessary for these individuals to communicate with those they represent. The presence of middlemen organizations will help, e.g., those NGO organizations that act as a single conduit through which government officials can communicate with multiple nongovernmental organizations, but improved technologies allowing for direct exchanges in the communications-unfriendly environments found in many parts of megacities remain an outstanding need. General Townsend called for a "sensor-

[74] Ronald H. Cole, *Operation Urgent Fury: The Planning and Execution of Joint Operations in Grenada, 12 October – 2 November 1983*, Washington, D.C.: Joint History Office, Office of the Chairman of the Joint Chiefs of Staff, 1997, 4-5, http://www.jcs.mil/Portals/36/Documents/History/Monographs/Urgent_Fury.pdf (accessed June 15, 2018).

agnostic and platform-agnostic operating environment" to support joint sensor-to-shooter interfaces and provision of a common understanding of the operational environment. Joint would be a start; addressing the needs of a truly comprehensive approach is the ultimate goal.

Identify service and joint proponents for urban operations

Recent emphasis on continued improvement of both MDO understanding and urban operations capabilities are encouraging. That service and joint efforts to achieve the latter are less orchestrated than could be the case is less so. Informal cooperation has helped to address assisting otherwise disparate initiatives. However, the absence of overarching policy, guidance, and direction means that resources are not being employed to maximum effect and are sometimes counterproductive. Recent writings too often reflect authors' failure to familiarize themselves with the rich historical and doctrinal offerings available. Cooperation between services in moving the Multi-Domain Operations concept forward has, on the other hand, been notable. Yet similar cooperation when dealing with the challenges of operating in the world's largest urban areas is all but absent in the aftermath of U.S. Joint Forces Command casing its colors. The window for cooperation is open. The Department of Defense has of late been particularly fortunate in a slate of senior leaders championing teamwork in seeing MDO to maturation. That Multi-Domain Operations' current adolescence coincides with a recognition of the inevitability of future operations in large urban areas suggests there is considerable potential to make significant advances in the application of MDO in those environments as development progresses.

A final observation regarding recommendations

As is clear in the above-cited book *Darwin Comes to Town*, evolution need not be a matter of eons or decades but rather can occur over much lesser periods of time. Employing knowledge of the highly complex megacity environment to advise development of MDO seems to offer the twofer of achieving unprecedented inter-service (and broader) orchestration and preparedness for those urban operations sure to be fundamental to America's future security.

10. Concluding Observations

> Planning for operations that will be conducted in urban operations generally follows the same basic process as planning for operations in other environments – but also acknowledges that the challenges are sufficiently different and complex, requiring commanders and their staffs to give due consideration to the unique requirements of the urban environment.[75]
>
> Joint Publication 3-06, *Joint Urban Operations*

> Cops hate two things – change and status quo.[76]
>
> NYPD Commissioner James P. O'Neill

A quick online search makes it clear that many operations in Iraq and no few in Afghanistan were conducted in urban areas. Military services from participating members were perhaps more qualified to operate in those environments than ever before in the history of man as coalition numbers lessened in those theaters. But just as Vietnam demonstrated an attrition of jungle war-fighting skills in the aftermath of World War II, we are faced with the waning of urban operations talents within our armed forces. There is thus all the more reason to take advantage of external sources

[75] *Joint Urban Operations*, Joint Publication 3-06, Washington, D.C.: Joint Chiefs of Staff, November 20, 2013, p. III – 1.

[76] James P. O'Neill, "Preparing for and Managing Megacity Crises (The NYPD Perspective): 9/11 and Hurricane Sandy Lessons for U.S. Military Leaders," presentation at the "Multi-Domain Battle in Megacities" conference, Fort Hamilton, NY, April 3, 2018.

of knowledge to help in retaining essential expertise: allies from various theaters (particularly the megacity-heavy Indo-Pacific region); public servants in the security and public service arenas, e.g., the NYPD and FDNY; members of the commercial, NGO, IGO, and neighborhood association communities; academics with expertise in things urban; modeling and simulations experts; and others as emerging challenges suggest.

To what extent, we might therefore ask, are we inviting these less traditional partners to also assist in MDO's transition from adolescence to adulthood? Multi-Domain Operations are a means of bringing order to chaos, to manage Clausewitz's fog of war and the growing avalanche of data available to armed forces. Megacities are complex environments capable of introducing great chaos. Those most knowledgeable in the ways of megacities – those who live and work in them daily – will be the partners best able to assist in precluding, alleviating, or assisting in a return to normalcy from a state of chaos.

It pays to remind ourselves of a point made above: MDO in megacities will not be a linear process. MDO's competition, armed conflict, and return to competition components will be apparent simultaneously in multiple parts of an urban area. Where each is present will evolve over time. Resources will inevitably be in short supply. Better to allocate tasks, missions, and leadership to those partners more familiar with, better able to, and more experienced in dealing with specific challenges than assuming one organization alone can address or command all.

The above establishes the need for such melding of talents during training, exercises, planning, and actual operations. It stands to reason that broadly-based coalitions and

other partnerships should inform how we move forward in that maturation of MDO and our preparations for megacity undertakings. Perhaps the current set of military specialties merits rethinking such that they are less service or domain-specific than interactive and domain-spanning.

Major General Burr recognized the need to expand partnerships beyond intra-military alone. Ongoing efforts are but a start and rarely include the entirety of those the evolving operational environment suggests they should. There is a call for going where none have gone before.

It is particularly appropriate that the location for the conference summarized here was in New York. It is an able surrogate for others of extraordinary population size, geographic spread, physical and social complexity, interconnectedness, and similarly exceptional characteristics, to include influence with at least national and broader regional scope. With apologies to Frank Sinatra, if we can make it there, we can make it anywhere.

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Appendix 1: Conference Agenda

DAY 1: Tuesday, April 3, 2018

0800-0830 Assembly and Registration

0830-0900 Administration and Welcome

0900-1000 Overview Panel, "The Future of Multi-Domain Battle: Rethinking How We Think About Joint and Combined Operations" & "Megacities: Strategic Influence and MDB Implications"

- *Scott Norwood, Strategic Effects Director, U.S. Army Pacific*

- *Dr. Russell W. Glenn, Director, Plans and Policy, G-2, U.S. Army Training and Doctrine Command (TRADOC)*

1000-1030 Break

1030-1110 Preparing for and Managing Megacity Crises (The FDNY Perspective): 9/11 and Hurricane Sandy Lessons for U.S. Military Leaders

James E. Leonard, Chief, FDNY

1110-1150 Future War in Cities: Some Australian Thoughts

Major General Rick Burr, Deputy Chief of Australian Army

1150-1300 Lunch

1300-1340 Megacity Scenarios, Foundations, and Convergence

General Stephen J. Townsend, Commanding General, U.S. Army Training and Doctrine Command

1340-1420 The Warfighter and Megacities: How USARPAC is Preparing for Multi-Domain Battle in Future Operational Environments

General Robert Brown, Commanding General, U.S. Army Pacific

1420-1500 Preparing for and Managing Megacity Crises (The NYPD Perspective): 9/11 and Hurricane Sandy Lessons for U.S. Military Leaders

James P. O'Neill, Commissioner, NYPD

1500-1530 Break

1530-1615 Panel Discussion

- *James E. Leonard, Chief, FDNY*

- *Major General Rick Burr, Deputy Chief of Australian Army*

- *General Stephen J. Townsend, Commanding General, U.S. Army Training and Doctrine Command*

- *General Robert Brown, Commanding General, U.S. Army Pacific*

- *James P. O'Neill, Commissioner, NYPD*

1615-1630 First Day Wrap Up

DAY 2: Wednesday, April 4, 2018

0800-0810 Day 2 Welcome

0810-0850 Medical Care in Urban Disaster: From Hurricane Katrina to the 2017 Hurricane Season and Beyond

Dr. Sheri Fink, Author of Five Days at Memorial

0850-0930 Employing a Whole of Nation Approach in MDB

Jim Hake, CEO, Spirit of America

0930-1000 Break

1000-1040 Operation United Assistance: The Department of Defense Response to the West African Ebola Virus Epidemic

Commander Benjamin Espinosa, U.S. Navy Bureau of Medicine & Surgery

1040-1120 Effective Reaction: Response to the 2014-2015 Ebola Outbreak in West Africa

Dr. Joel Montgomery, Director, Director, Epidemiology Informatics Surveillance and Laboratory Branch, Centers for Disease Control and Prevention (CDC)

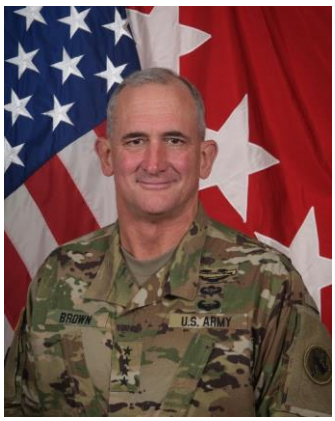
1120-1200 Panel, Megacity Preparation for and Response to Major Disaster

- *Dr. Sheri Fink, Author of* Five Days at Memorial
- *Jim Hake, CEO, Spirit of America*
- *Commander Benjamin Espinosa, U.S. Navy Bureau of Medicine & Surgery*
- *Dr. Joel Montgomery, Director, Epidemiology Informatics Surveillance and Laboratory Branch, Centers for Disease Control and Prevention (CDC)*

1200-1220 Event Wrap Up

Appendix 2: Speakers

General Robert B. Brown, Commanding General, U.S. Army Pacific (USARPAC)



General Robert B. Brown assumed command of the United States Army's largest service component command, U.S. Army Pacific (USARPAC), April 30, 2016. The command is headquartered at Fort Shafter, Hawaii with portions of the command forward-deployed and based throughout the Indo-Asia Pacific. USARPAC's 106,000 active and reserve soldiers and Department of the Army civilians support the nation's strategic objectives and commitment to the region.

Prior to this assumption of command, General Brown most recently served as the Commanding General, U.S. Army Combined Arms Center at Fort Leavenworth, Kansas where he led the synchronization of education, leader development, training support & development, and the development and integration of the doctrine the U.S. Army uses to fight and win our nation's wars.

During various times during his service, General Brown has served twelve years with units focused on the Indo-Asia Pacific region, including Commanding General, I Corps and Joint Base Lewis-McChord; Deputy Commanding General of the 25th Infantry Division including a second deployment to Operation Iraqi Freedom; Training & Exercises Director J7, United States Pacific Command (USPACOM);

Executive Assistant to the Pacific Command Commander; Plans Officer, United States Army Pacific (USARPAC); and Commander of the 1st Brigade Combat Team (Stryker), 25th Infantry Division including a deployment to Operation Iraqi Freedom. General Brown was commissioned a second lieutenant of infantry from the United States Military Academy in May 1981, and has served in many leadership positions from platoon to corps, including as platoon leader and company commander in mechanized infantry units at Fort Carson, Colorado; battalion commander of 2-5 Cavalry, a mechanized infantry battalion at Fort Hood, Texas and including a deployment to Bosnia-Herzegovina in support of OPERATION JOINT FORGE; and Commanding General of the Maneuver Center of Excellence (Infantry and Armor Forces) and Fort Benning, Georgia.

General Brown has also served in numerous staff positions including: Assistant Professor of Military Science and Deputy Director, Center of Enhanced Performance, United States Military Academy; plans officer at USARPAC;

operations officer, executive officer, and Chief, G-3 Training in the 25th Infantry Division including a deployment in support of OPERATION UPHOLD DEMOCRACY in Haiti; personnel assignment officer in Human Resources Command; Aide-de-Camp/Assistant Executive Officer to the Vice Chief of Staff, Army; plans officer in the Department of the Army G-3/5/7; program analyst in the Dominant Maneuver Assessment Division, Joint Staff (J8); Executive Assistant to the U.S. Pacific Command Commander and Director, J-7 (Training and Exercises) at USPACOM; and Chief of Staff United States Army Europe (USAREUR)/Deputy Commanding General U.S. Army NATO.

His decorations include the Distinguished Service Medal (two Oak Leaf Clusters), the Defense Superior Service Medal, Legion of Merit, Bronze Star Medal (Oak Leaf Cluster), Defense Meritorious Service Medal, Meritorious Service Medal (Oak Leaf Cluster), Joint Service Commendation Medal, Army Commendation Medal (three Oak Leaf Clusters), and the Army Achievement Medal. He has earned the Combat Infantryman Badge, Expert Infantryman Badge, Parachutist Badge, Air Assault Badge, Joint Chiefs of Staff Identification Badge, and the Army Staff Identification Badge.

General Brown holds a Bachelor of Science from the United States Military Academy, a Master of Education from the University of Virginia, and a Master of Science in National Security and Strategic Studies from National Defense University (Distinguished Graduate).

Major General Rick Burr, AO, DSC, MVO, Deputy Chief of Army, Australia

Major General Burr is the Deputy Chief of the Australian Army, a position he has held since January 2015. Graduating from the Royal Military College, Duntroon in 1985, his diverse career encompasses unique service as Deputy Commanding General, U.S. Army, Pacific, command of the 1st Division/Deployable Joint Force Headquarters and command of the Special Air Service Regiment. His operational commands have included the International Security Assistance Force Special

Operations Forces (ISAF SOF) in Afghanistan and Australian Special Forces Task Groups in Afghanistan and Iraq.

His broad experience also includes senior adviser in the Department of Prime Minister and Cabinet; Director General of Military Strategic Commitments; Director General of Preparedness and Plans (Army); Chief Instructor of the Australian Defence Force Warfare Centre; instructor at the Royal Military College, Duntroon; and Equerry to Her Majesty Queen Elizabeth II.

Major General Burr is a Distinguished Graduate of the United States Marine Corps Command and Staff College and graduate of the USMC School of Advanced Warfighting. He holds a Bachelor of Arts and a Master of Military Studies. In 2016, he completed the Harvard Business School Advanced Management Program. His personal awards include the Officer of the Order of Australia, Distinguished Service Cross, Member of the Royal Victorian Order, and a number of foreign awards for distinguished service. He is Patron of Defence Australian Rules Football and a Director of the Australian American Education Leadership Foundation.

Commander Benjamin Espinosa, Program Manager, Weapons of Mass Destruction Defense Operational Medicine & Capabilities Development Navy Bureau of Medicine & Surgery

CDR Benjamin Espinosa was born in Pasadena, California. He received a Bachelor of Arts in Molecular, Cellular, and Developmental Biology from the University of Colorado in Boulder, Colorado, and a PhD in Microbiology from Colorado State University in Fort Collins, Colorado where his work focused on novel vaccine development for tuberculosis. He joined the Navy as a direct commission in March of 2005.

CDR Espinosa reported to his first assignment as the Deputy of Bacteriology at the Naval Medical Center Research Detachment (NMRCD) in Lima, Peru. Subsequent assignments included Director of Parasitology at NMRCD-Peru; microbiologist and laboratory director at the Navy Environmental Preventive Medicine Unit 2 in Norfolk, Virginia; Assistant Officer-in-Charge of the Forward Deployable Preventive Medicine Unit in Camp Buehring, Udari, Kuwait (two tours); and Head of Operations at the Naval Medical Research Center - Biological Defense Research Directorate in Frederick, Maryland. CDR Espinosa's current assignment is as a subject matter expert and Program Manager in the Navy Bureau of Medicine and Surgery (BUMED) Countering Weapons of Mass Destruction (CWMD) branch.

CDR Espinosa's humanitarian assistance and disaster response experience includes on-site coordination of Navy assistance during the 2007 earthquake in Ica, Peru, which measured 8.0 and killed over 500 people; various disease outbreaks in the Peruvian Amazon; the 2009 H1N1 pandemic influenza response in Kuwait and West Africa; multiple norovirus outbreaks and epidemiological investigations among U.S. military members; and most recently, serving as the Officer-in-Charge of the Navy's deployable diagnostic laboratory during the 2014 Ebola crisis in West Africa. CDR Espinosa also served three years as the Navy Gatekeeper for the CDC's Laboratory Response Network where he managed the U.S. Navy's laboratory diagnostics response to the H7N9 and MERS-CoV outbreaks.

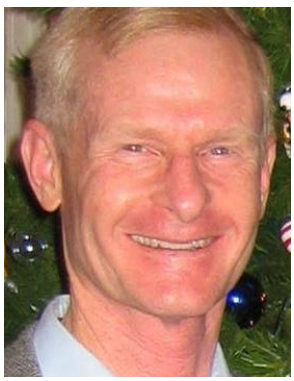
CDR Espinosa's awards include the Navy and Marine Corps Commendation Medal (five awards), Joint Service Achievement Medal, and other unit and campaign awards.

Dr. Sheri Fink, Pulitzer Prize winner and Author, *Five Days at Memorial*

Sheri Fink is the author of *The New York Times* bestselling book, *Five Days at Memorial: Life and Death in a Storm-Ravaged Hospital* (Crown, 2013), about choices made in the aftermath of Hurricane Katrina. She is a correspondent at *The New York Times* where her and her colleagues' stories on the West Africa Ebola crisis were recognized with the 2015 Pulitzer Prize for

international reporting, the George Polk Award for health reporting, and the Overseas Press Club Hal Boyle Award. Her story "The Deadly Choices at Memorial," co-published by *ProPublica* and *The New York Times Magazine*, received a 2010 Pulitzer Prize for investigative reporting and a National Magazine Award for reporting. A former relief worker in disaster and conflict zones, Fink received her M.D. and PhD from Stanford University. Her first book, *War Hospital: A True Story of Surgery and Survival* (PublicAffairs), is about medical professionals under siege during the genocide in Srebrenica, Bosnia-Herzegovina. *Five Days at Memorial* was the winner of the National Book Critics Circle Award for nonfiction, the PEN/John Kenneth Galbraith Award for nonfiction, the Ridenhour Book Prize, the J. Anthony Lukas Book Prize, The Los Angeles Times Book Prize, the Southern Independent Booksellers Alliance Book Award, the American Medical Writers Association Medical Book Award, and the National Association of Science Writers Science in Society Journalism Book Award.

Dr. Russell W. Glenn, Director, Plans and Policy G-2, U.S. Army Training and Doctrine Command



Dr. Russell W. Glenn is a graduate of the United States Military Academy. He was commissioned in the United States Army as a Corps of Engineers officer and initially served with the 1st Infantry Division. Subsequent assignments included duties as operations officer for the 2nd Engineer Group in the Republic of Korea, assistant professor of mathematics at West

Point, and a three-year tour with the 3rd Armored Division headquartered in Frankfurt, Germany. His time with the division included a combat tour in Iraq during Operations Desert Shield and Desert Storm. Then Major Glenn thereafter served as an exchange officer with the British Army's Royal School of Military Engineering followed by a year as the senior army fellow at the RAND Corporation and three years with the School of Advanced Military Studies (SAMS), concluding a 22-year military career as one of the initial four authors of the army's primary war fighting doctrine. Dr. Glenn was a senior defense analyst with RAND from 1997 to early 2009 at which time he joined A-T Solutions as a senior analyst. He last served as an associate professor with the Strategic and Defence Studies Centre at The Australian National University in Canberra.

Past research includes published studies on counterinsurgency, urban operations, military and police training, and intelligence operations. Dr. Glenn has a Bachelor of Science degree from the United States Military Academy and masters' degrees from the University of Southern California (MS, Systems Management), Stanford University (MS, Civil Engineering and MS, Operations Research), and the School of Advanced Military Studies (Master of Military Art and Science). He earned his PhD in American history from the University of Kansas with secondary fields of military history and political science. Military education includes airborne, Ranger, and pathfinder qualifications. Dr. Glenn has appeared as a subject matter expert on *CNN Reports, MSNBC, National Public Radio,* and *The History Channel* in addition to being cited in *The Economist, Jane's Defence Weekly, The Los Angeles Times, Scientific American, The Wall Street Journal,* and Associated Press syndicated

articles. He is the author of over fifty books or book length reports in addition to many articles. His most recent book is *Rethinking Western Approaches to Counterinsurgency: Lessons from Post-colonial Conflict* (Routledge). He is author-editor of a forthcoming volume sponsored by the Association of the United States Army entitled *Trust and Leadership: The Australian Army Approach to Mission Command.*

Jim Hake, Chief Executive Officer, Spirit of America

Jim founded Spirit of America (SoA) in response to the attacks of 9/11. SoA is a citizen-funded 501c3 nonprofit that provides humanitarian, economic and non-lethal assistance in response to needs identified by deployed US troops and diplomats.

Spirit of America has established a groundbreaking partnership with the U.S. military and is the only private nonprofit with personnel working alongside deployed military teams and providing assistance in support of their missions. SoA is a "not-neutral" NGO; it only provides assistance in support of the safety and success of U.S. troops and diplomats and the local people they seek to help. This is a new model of providing private assistance in support of national security objectives that General (Ret.) Stanley McChrystal calls "an innovation important to our country's future." Prior to Spirit of America, Jim was an Internet entrepreneur. He founded Access Media, one of the first Internet media companies, and sold it to SOFTBANK Forums.

It was later incorporated into Ziff Davis. In 2000 and 2001, Jim was named a "Technology Pioneer" by the World Economic Forum. Jim is a member of the Council on Foreign Relations and honorary member of the U.S. Army Civil Affairs Regiment. He is a contributor to *Warriors and Citizens* – a book on civil-military relations – and has been published in *The Wall Street Journal.* He received a BA and graduated with distinction in economics from Dartmouth College and earned a MBA from the Stanford University Graduate School of Business.

James E. Leonard, Chief of Department, New York City Fire Department (FDNY)

The Chief of Department, appointed by the Fire Commissioner, is the highest ranking uniformed member of the Department, overseeing 15,000 uniformed firefighters and emergency medical services (EMS) personnel. The 35th Chief of Department, Chief Leonard was appointed by Commissioner Nigro in 2014.

Chief Leonard's career with the department began as a firefighter with Engine 310 in Brooklyn in 1979. In 1986, he became a fire marshal and was assigned to the "Red Cap" street patrol, which was created to fight the arson blight that had plagued parts of the city at that time. In 1987, he returned to firefighting, serving on Staten Island with Ladder 85. He returned to Brooklyn when he was promoted two years later, in 1989, to lieutenant and assigned to Ladder 168 and, with his promotion to captain in 1993, he led Engine 243. Following his

promotion to battalion chief in 1996, he served at Battalion 31 in Brooklyn, Battalion 22 in Staten Island and Battalion 2 in Manhattan. In 2002, he was promoted to Deputy Chief and worked in Division 8, which covers Staten Island and southern Brooklyn.

In 2010, Chief Leonard was appointed Deputy Assistant Chief and assigned as Brooklyn Borough Commander with overall responsibility for the department's largest field force by borough with more than 75 units and 2,000 firefighters and fire officers. He also responded city-wide to all major emergencies while serving simultaneously as a city-wide tour commander, including as the incident commander at the March 12, 2014 explosion and collapse in East Harlem. During Hurricane Sandy in October 2012, Chief Leonard supervised all fire operations and response in Brooklyn as borough commander.

Chief Leonard holds an associate degree in criminal justice and a Bachelor of Arts in sociology, both from St. Francis College, and a MS degree in Fire Protection Management from John Jay College. A native New Yorker, Chief Leonard lives on Staten Island with his wife, Patricia.

CAPT Joel Montgomery, PhD, Chief, Epidemiology, Informatics, and Surveillance Lab Branch, Division of Global Health Protection

CAPT Joel Montgomery, PhD, is chief of the Epidemiology, Informatics, and Surveillance Lab Branch (formally Global Disease Detection Branch) in CDC's Division of Global Health Protection. Dr. Montgomery brings many years of in-depth global experience as a laboratorian/microbiologist and epidemiologist to his role where he is responsible for coordinating scientific efforts in ten Global Disease Detection country offices and implementing technical aspects of the Global Health Security Agenda.

For the past sixteen years, Dr. Montgomery has played a key role in CDC's global health protection efforts. Most recently, he served as director of the division's programs in CDC-Kenya and principal deputy director for Kenya's country office where he led a staff of over 500 diverse professionals and managed a budget of over $20 million. In Kenya, he oversaw and directed public health research activities in two large population-based cohorts: a rural site in Western Kenya and an urban settlement (Kibera slum) in Nairobi. These sites provided a strong foundation for understanding the burden and etiology of infectious diseases in Kenya and for evaluating strategies to reduce morbidity and mortality.

Dr. Montgomery's efforts to build public health capacity extended beyond Kenya's borders. He helped lead CDC's Ebola response and deployed to Liberia three times during the 2014 outbreak. He also helped recognize, respond to, and characterize a large dengue outbreak in Somalia and Kenya and implemented the first ever surveillance for dengue and other infectious diseases in Mogadishu, Somalia.

Prior to his appointment in Kenya, Dr. Montgomery served for five years as director of the Department of Emerging Infections at the U.S. Naval Medical Research Unit Six (NAMRU-6) in Lima, Peru. In this position, he directed an innovative study in the Amazon looking at changes in human land use patterns on disease transmission.

At CDC, Dr. Montgomery has worked closely with the Influenza Division to better define the burden of influenza and other respiratory diseases, seasonal transmission dynamics, and risk factors for infection. Dr. Montgomery is an alumnus of CDC's Epidemic Intelligence Service (EIS) program. He received his training in the Viral Special Pathogens Branch where he was involved with several high-profile international outbreaks including SARS in Vietnam, Monkeypox, and Nipah virus in Bangladesh and Marburg hemorrhagic fever in Angola.

Dr. Montgomery has received numerous awards for outstanding public health service, including the U.S. Naval and U.S. Public Health Service Commendation Medals. He has a PhD in Molecular Parasitology from the University of Texas and is an adjunct faculty member at both the University of Washington and Tulane University. Dr. Montgomery serves as editor for several scientific journals and has published over 100 scientific papers. He is also a seasoned public speaker and was recently featured in a *New Yorker* article, "When the Fever Breaks."

J. Scott Norwood
Strategic Effects Director, U.S. Army Pacific

Mr. Norwood serves as Strategic Effects Director, U.S. Army Pacific (USARPAC). In this role, he advises the commander with respect to the theater environment, campaign strategy, and the synchronization of campaign activities and communications with theater partners. He also advises the commander on development of future force concepts and capabilities with specific emphasis on Multi-Domain Battle and strategic programs.

Mr. Norwood joined USARPAC following his assignment as Executive Director of Strategy, Policy, and Plans, Combined Security Transition Command, Afghanistan. Prior assignments in the senior executive service (SES) include a fellowship at the Naval Postgraduate School and a five-year tour of duty as Deputy Director for Global Security Affairs, Strategic Plans and Policy, Joint Staff.

Mr. Norwood served 27 years in the U.S. Air Force as a fighter pilot before becoming a SES. While on active duty, he served as a policy and issues analyst for the Secretary of the Air Force; as commander of a USAF fighter and bomber test group; as Director of Operations, Cheyenne Mountain, NORAD/USPACECOM during 9/11; and as Senior Military Assistant to the Administrator of the Coalition Provisional Authority during the occupation of Iraq.

Mr. Norwood's wife, Carol Ann, is a school teacher who originally hailed from Newport, Arkansas. They have two children, Matthew (26) and Samantha (24).

CAREER CHRONOLOGY:

2015-present: Strategic Effects Director, U.S. Army Pacific

2013-2014: Executive Director of Strategy, Policy, and Plans; Combined Security Transition Command, Afghanistan.

2010-2013: DoD Fellow in Security Studies, Naval Postgraduate School

2005-2009: Deputy Director for Global Security Affairs, Strategic Plans and Policy; the Joint Staff

2004-2005: Chief, Central and South Asia Division, Directorate for Strategic Plans and Policy, the Joint Staff

2003-2004: Senior Military Assistant to the Administrator of the Coalition Provisional Authority in Iraq

2002-2003: Military Assistant to the Principle Deputy Under Secretary of Defense for Policy, Office of the Secretary of Defense

2000-2002: Director of Operations, Cheyenne Mountain, NORAD/USPACECOM

POSTGRADUATE EDUCATION:

- 1993, Master of Arts Degree, Air and Space Studies, U.S. Air Force School of Advanced Air and Space Studies, *Top academic graduate*
- 1992, Master of Arts Degree, National Security and Strategic Studies, Naval War College, *Graduate of Highest Distinction and the Recipient of the Colbert Memorial Prize*

1985, Master of Science Degree, Systems Management, University of South California

AWARDS AND HONORS:

- U.S. State Department Superior Honor Award
- CJCS Joint Distinguished Civilian Service Award
- U.S. Army Meritorious Civilian Service Award
- Colbert Memorial Prize, Naval War College, 1992
- U.S. Air Force Lance Sijan Award, 1991
- Defense Superior Service Medal (4)
- Distinguished Flying Cross
- Air Medal (3)

James P. O'Neill, Police Commissioner, NYPD

James P. O'Neill was appointed the 43rd police commissioner of the City of New York by Mayor Bill de Blasio in September 2016. He had served previously as chief of department, the NYPD's highest uniformed rank. He was instrumental in developing neighborhood policing, which is renewing and recasting the NYPD's patrol function to provide greater police and community interaction and collaboration.

Widely experienced in both the patrol and the investigative sides of the department, Commissioner O'Neill is a hands-on police practitioner and a dedicated police

reformer. He speaks with urgency about the need for police to evolve if they are to succeed in connecting with communities and about keeping people safe in the 21st century.

Police Commissioner O'Neill began his law enforcement career in 1983 with the Transit Police, which was then an independent police department. He credits his time on patrol on the trains and platforms of the subway system with helping him learn how to interact and communicate with a wide range of people, a skill he regards as essential to successful police work. He had risen to lieutenant by the time of the 1995 merger of the Transit Police with the NYPD.

As a lieutenant in the NYPD, he worked at the police academy and the warrant squad before being promoted to captain and executive officer in the 52nd Precinct in the northern Bronx. He served as the commanding officer of three successive precincts: Central Park, the 25th Precinct in eastern Harlem, and the 44th Precinct in the western Bronx. He was C.O. of the 25th Precinct during the attacks of September 11th and remembers being proud of the way his fellow officers from all across the department came together to help and protect people during that crisis.

It was as C.O. of the 44th Precinct, one of the busier commands in the city, that Commissioner O'Neill began to think seriously about reforming the NYPD patrol model. The precinct workload in the NYPD had long been divided between patrol officers who answered a steady stream of calls for service and specialty officers who worked at correcting conditions and community outreach. As Commissioner O'Neill saw it, police departments had been asking their patrol officers to connect with community members for generations without ever giving them the time or the

opportunity to do so. He envisioned a model with fewer specialists and more generalist officers who answered calls, worked at problem-solving and local crime-fighting, and collaborated far more effectively with community members.

Promoted to inspector and then to deputy chief, Commissioner O'Neill moved to the investigative side of the department, serving tours as commanding officer of the Vice Division, the Narcotics Division, and the Fugitive Enforcement Division. He worked in all three divisions to keep cases focused on reducing crime and supporting the priorities of precinct commanders. In March 2014, he was appointed commanding officer of Police Commissioner William Bratton's office and played a key role in the department's reengineering process, concentrating on operational reforms. As chief of patrol from June 2014, he began the development of neighborhood policing by anchoring officers in sectors and providing them with off-radio time to connect with community members and work at local problem-solving and crime-fighting.

He was appointed chief of department in December 2014, and early on in his term, he helped lead the department through the shock and mourning that followed the assassinations of Detectives Rafael Ramos and WenJian Liu.

Neighborhood policing—which is a crime-fighting plan above all else—has been implemented in more than half of New York City precincts as well as all of the NYPD Housing Bureau police service areas and is serving more than three million New Yorkers. It is the largest, best-funded, best-staffed community-policing initiative ever undertaken in the United States. Commissioner O'Neill's reforms are taking hold and will have a far-reaching and positive influence all across New York City.

Commissioner O'Neill grew up in the Flatbush section of Brooklyn and was one of

seven children. He has two sons, Daniel and Christopher. He is an avid hockey player and motorcyclist.

Commissioner O'Neill has a clear vision of where he is taking the New York City Police Department. "Fighting crime is what we get paid to do," he says. "But we can't do that unless we achieve full partnership with the community. Unless we have that connectivity, it's not going to work."

General Stephen J. Townsend, Commanding General, U.S. Army Training and Doctrine Command

General Stephen J. Townsend assumed duties as Commander, United States Army Training and Doctrine Command on March 2, 2018 after serving as Commander, XVIII Airborne Corps, the U.S. Army’s rapid deployment contingency corps, and Fort Bragg, North Carolina.

Raised in an army family, General Townsend calls Griffin, Georgia his hometown. He commissioned into the infantry upon graduating from North Georgia College in 1982.

General Townsend has led and commanded troops at every echelon from platoon to corps and combined joint task force. He has soldiered with four regiments; the 505th Parachute Infantry, 21st Infantry, 31st Infantry, and 75th Ranger Regiment; and with five divisions: the 82d Airborne Division, 7th Infantry Division (Light), 10th Mountain Division (Light), 2d Infantry Division, and 101st Airborne Division (Air Assault).

His key staff assignments include service as a planner and operations officer at battalion, brigade, division, and joint task force levels. At U.S. Pacific Command, he was the J-5 strategy and plans officer for China and later Special Assistant to the Commander. At U.S. Central Command, he was the Executive Officer to the Commander. On the Joint Staff, he was the Director of the Pakistan-Afghanistan Coordination Cell.

General Townsend's combat and operational experience include Operation Urgent Fury, Grenada; Operation Just Cause, Panama; and Operation Uphold Democracy, Haiti. During Operation Iraqi Freedom, he led 3-2 Stryker Brigade, Task Force Arrowhead, on offensive operations across Iraq during "the Surge." He served four tours in Afghanistan during Operation Enduring Freedom culminating as Commander, 10th Mountain Division (Light). Most recently, General Townsend led all U.S. and multi-national troops fighting the Islamic State in Iraq and Syria as Commander, Combined Joint Task Force – Operation Inherent Resolve.

General Townsend holds a bachelor's degree, two master's degrees, the Air Assault Badge, the Master Parachutist Badge, the Ranger Tab, the Combat Action Badge and the Combat Infantryman's Badge with star.

About the Authors

Dr. Russell W. Glenn

Director, Plans and Policy, G-2, U.S. Army Training and Doctrine Command

See speaker bio above.

Mr. Eric L. Berry

Chief, WSMR Support Branch, G-2, U.S. Army Training and Doctrine Command

Mr. Berry possesses over 30 years' experience in research, development, and application of threat analysis in support of army and joint capabilities development, concept development, training, and experimentation. In his current position with the TRADOC G-2, he leads a team of senior threat analysts informing army, DOD, and national-level decision makers on key acquisition programs and future force design and composition. He retired from the U.S. Navy Reserve in 2013 as a commander, after extensive leadership and intelligence production experience with various service and joint intelligence and operational commands to include service as the Assistant Chief of Staff for Intelligence/N2, Commander 7th Fleet Det. 111; XO of Pacific Fleet 0194; and operations officer for the U.S. Strategic Command Joint Intelligence Center. His education includes a Bachelor of Arts degree from the University of Maryland (East European Area Studies), and master's degrees from Benedictine College (Executive Master of Business Administration) and the U.S. Army War College (Strategic Studies).

Mr. Colin Christopher

Intelligence Analyst, Fusion Directorate, G-2, U.S. Army Training and Doctrine Command

Mr. Colin Christopher is a former U.S. Army intelligence analyst with thirteen years' experience working with the U.S. Army. His service included two deployments to Iraq (Mosul 2006-07 and Maysan/Dhi Qar/Muthanna 2009-10) as part of a brigade combat team (BCT). He holds a Bachelor of Arts in political science and a Master of Business Administration (MBA). Colin's current role includes support to Multi-Domain Operations with emphasis on training to operate in a megacity or dense urban environment.

Mr. Thomas A. Kruegler

Strategic Planner, G2, U.S. Army Training and Doctrine Command

Mr. Thomas A. Kruegler has served with the United States Army for the past forty years, to include thirty years of active federal commissioned service and ten years as a Department of the Army civilian. The majority of his professional experience has been in the fields of command, operations, intelligence, and senior leader education and training. Mr. Kruegler has over twenty years of experience working in professional military education, having served on the staff and faculty at the United States Military Academy at West Point, U.S. Army Command and General Staff College, and U.S. Army War College before his assignment to Headquarters TRADOC.

Mr. Nicholas A. Marsella

Director, Devil's Advocate Red Team, G2, U.S. Army Training and Doctrine Command

Nick Marsella is a retired U.S. Army colonel having performed assignments in military intelligence and as a foreign area officer and joint planner. His assignments include command and staff positions with multiple tours in the 24th and 3rd Infantry Divisions (Mechanized), 25th Infantry Division, VII (US) Corps, and the Mission Command Training Program. He is a graduate of Villanova University (Master of Arts in Political Science), Old Dominion University (Master of Science in Education), and is a doctoral candidate at the College of William and Mary. He is a graduate of numerous military courses and programs to include studies at the U.S. Army War College, Senior and Combined Joint Warfighter Course at the Armed Forces (Joint) Staff College, Foreign Area Officer Course, and the Defense Language Institute. As a civilian, he has attended senior leader programs at the John F. Kennedy School of Government, Harvard University (Senior Fellows Program), University of Virginia (Certificate in Leadership), and Federal Executive Institute (Leadership in Democratic Society Program).